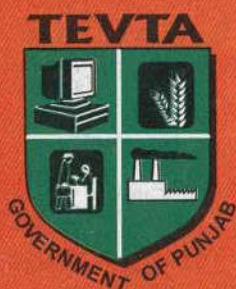
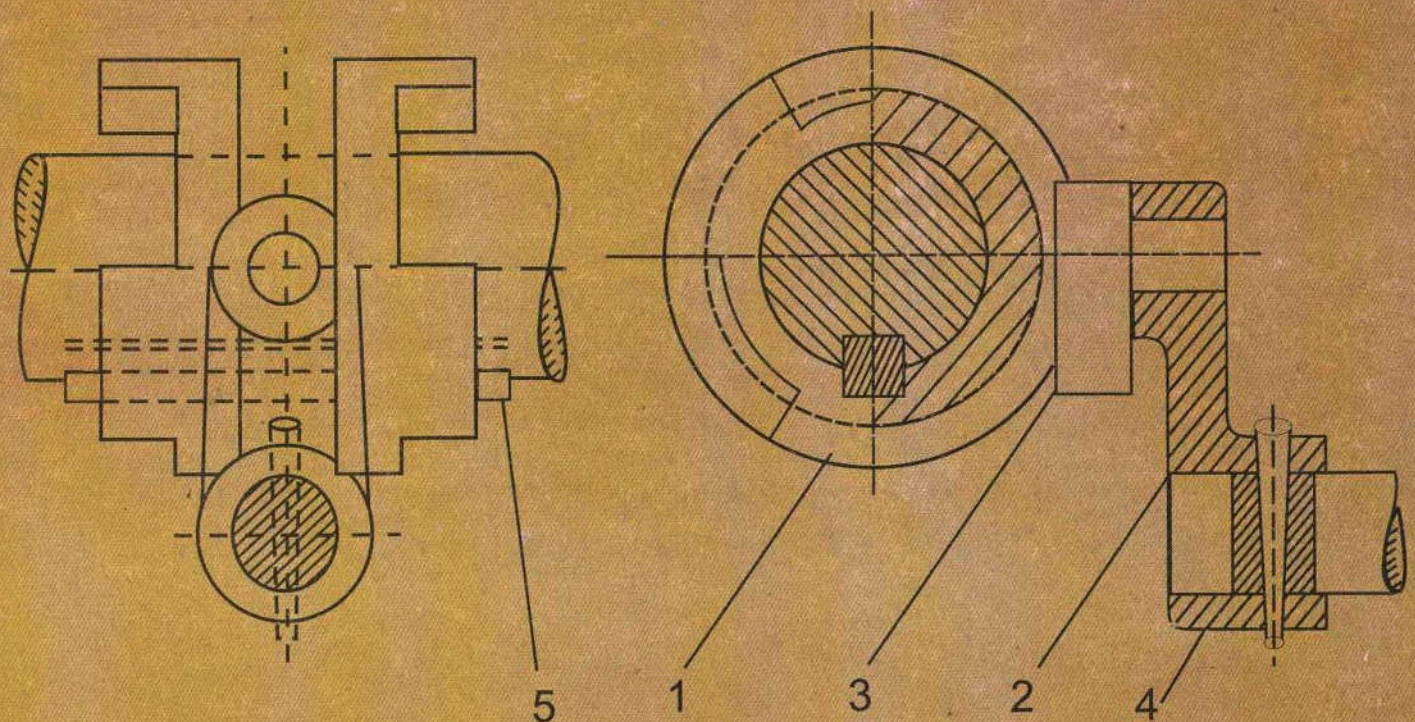


TECHNICAL DRAWING METAL TRADES 2



GOVERNMENT OF THE PUNJAB
TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY
PUNJAB BOARD OF TECHNICAL EDUCATION
TRADE TESTING CELL, LAHORE.

T.T.P. Series No.8

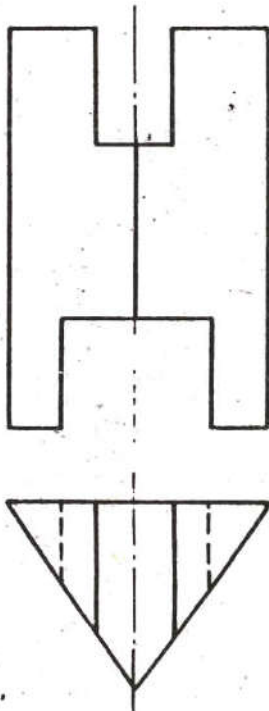
Price Rs. 30/-



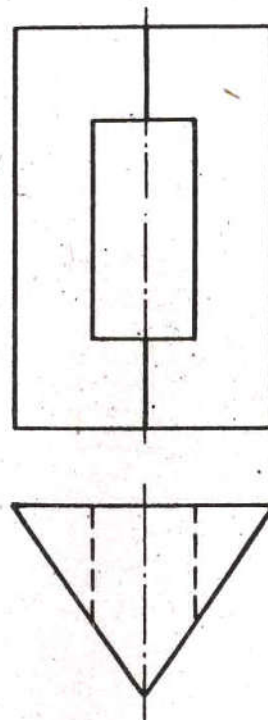
Rectangular Cuts on Prisms with Triangular Base

Exercise: Sketch the side view of each of these objects.

1



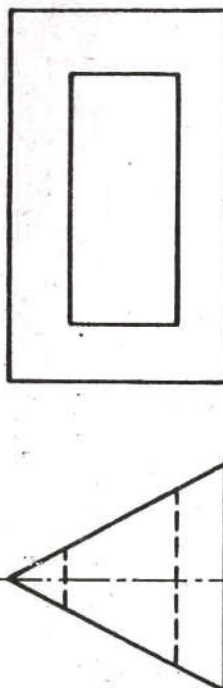
2



3



4



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

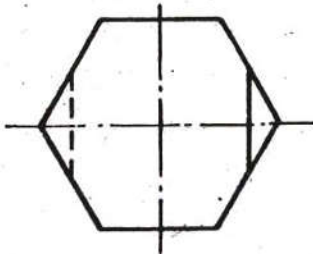
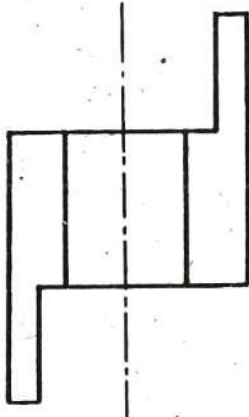
Technical
Drawing
No. 50

Rectangular Cuts on Prisms with Hexagonal Base

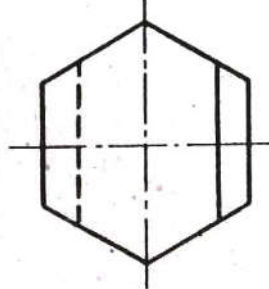
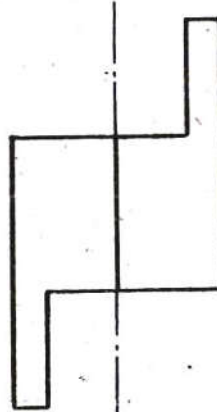
9.

Exercise: Sketch the side view of each of these objects.

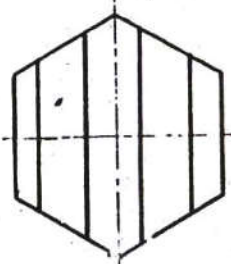
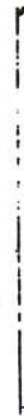
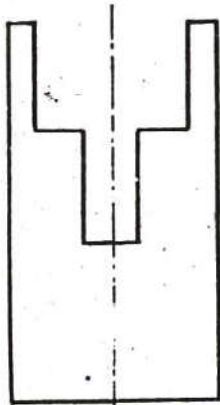
1



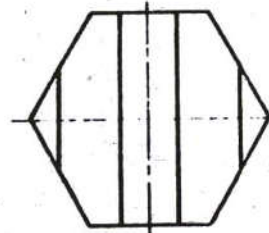
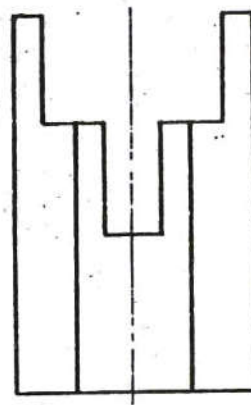
2



3



4



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 51

Technical Representation of Fits

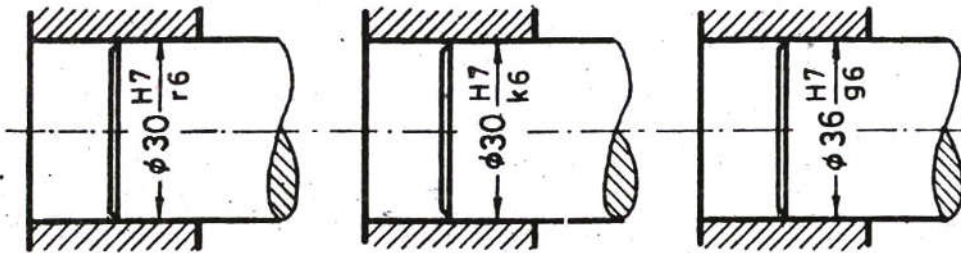


Table of Off-Sizes

Nominal Size (mm)	ISO SYMBOL	Off-sizes (mm)	Upper and lower Limiting case	TYPE of FIT
φ 30	H7	$\frac{+21}{0}$	1 min. Interference	-----
	r6	$\frac{+41}{+28}$	2 max. Interference	
φ 30	H7	$\frac{+21}{0}$	1 max. Clearance	-----
	k6	$\frac{+15}{+2}$	2 max. Interference	
φ 30	H7	$\frac{+21}{0}$	1 max. Clearance	-----
	g6	$\frac{-7}{-20}$	2 min. Clearance	

Exercise:

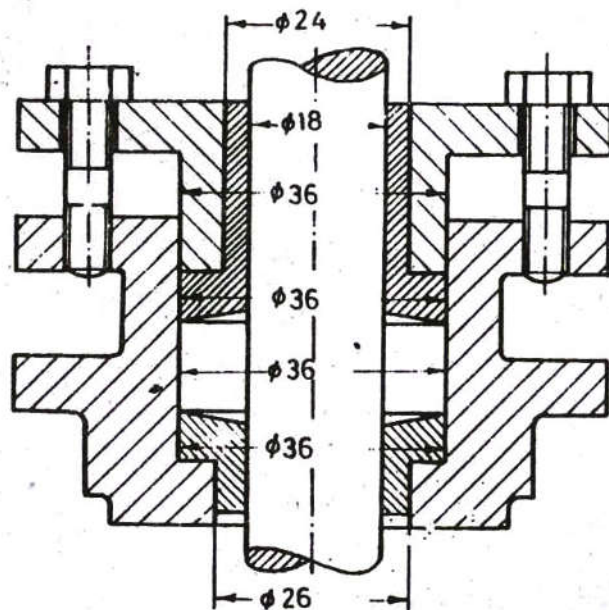
Under the heading 'Type of Fit' enter the words:
 CLEARANCE-FIT
 INTERFERENCE-FIT
 TRANSITION-FIT
 in the correct place.

Note: The ISO-symbols for holes (capital letters) stand high !
 The ISO-symbols for shafts (small letters) stand low !

Exercise:

Enter the ISO-symbols of the fits from the table in the drawing of the Packing Box !

Nominal size	Fits	
	Hole	Shaft
φ 18	H7 $\frac{+18}{8}$	h9 $\frac{+34}{+23}$
φ 24	H8 $\frac{+33}{0}$	h9 $\frac{0}{-52}$
φ 26	H8 $\frac{+33}{0}$	h9 $\frac{0}{-52}$
φ 36	H8 $\frac{+39}{0}$	h9 $\frac{0}{-62}$



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
 Drawing
 No. 52

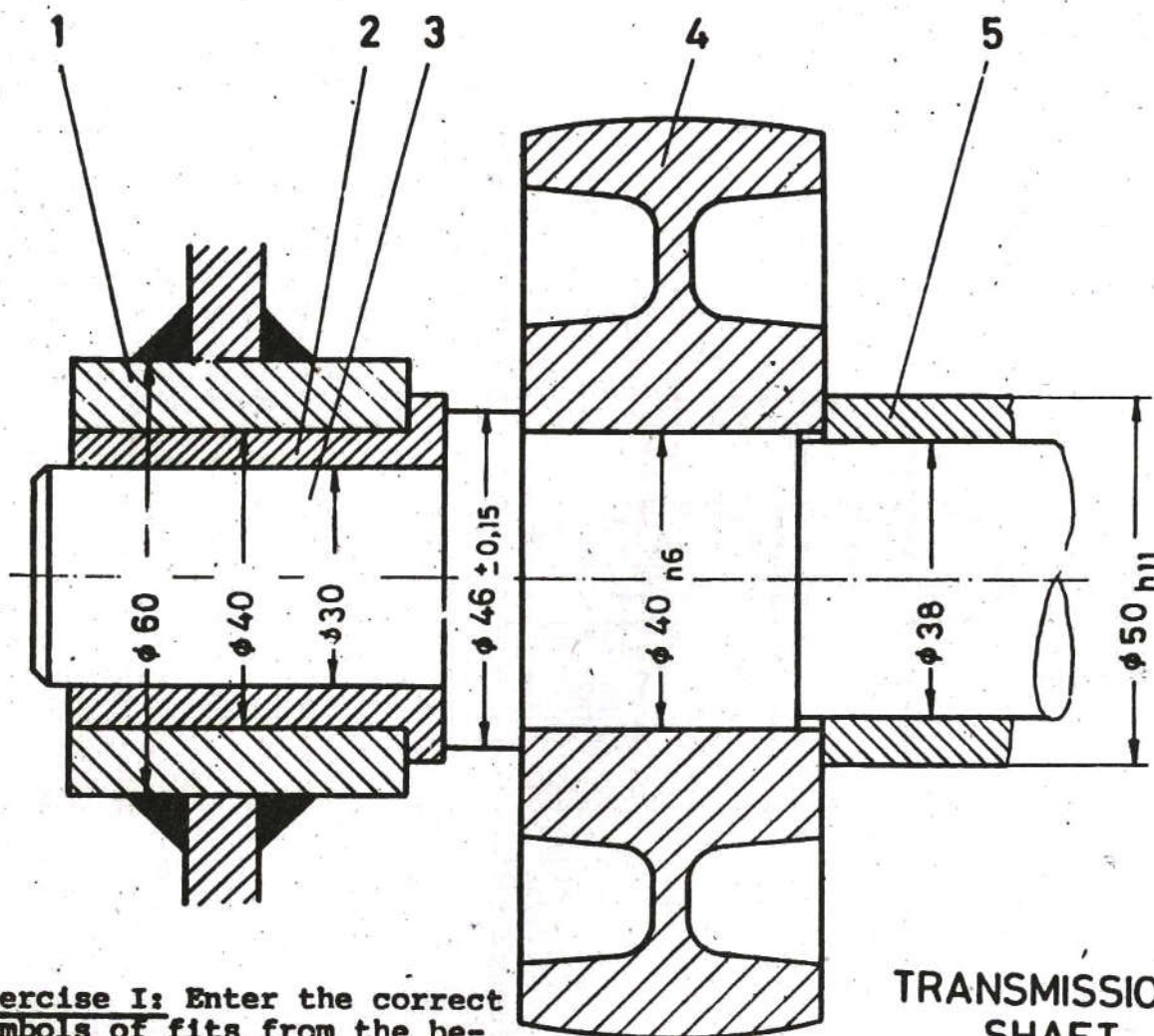


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Types of Fits

5



Exercise I: Enter the correct symbols of fits from the below table behind the nominal sizes in the above drawing.

**TRANSMISSION
SHAFT
M 1:1'**

Nominal Size (mm) with Fit	30 ^{E9}	30 _{h9}	38 ^{H7}	38 _{h6}	40 ^{H7}	40 _{n6}	40 _{r6}	50 _{h11}	60 _{h9}	60 ^{H8}
Off- Sizes	$\frac{+92}{+40}$	$\frac{0}{-52}$	$\frac{+25}{0}$	$\frac{0}{-16}$	$\frac{+25}{0}$	$\frac{+33}{+17}$	$\frac{+50}{+34}$	$\frac{0}{-160}$	$\frac{0}{-74}$	$\frac{+46}{0}$

Exercise II: Cross the correct Type of the Fits with the help of the above table.

Type of Fit \ Fit	60 ^{H8} _{h9}	40 ^{H7} _{r6}	30 ^{E9} _{h9}	40 ^{H7} _{n6}	38 ^{H7} _{h6}
Force-Fit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transition-Fit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clearance-Fit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



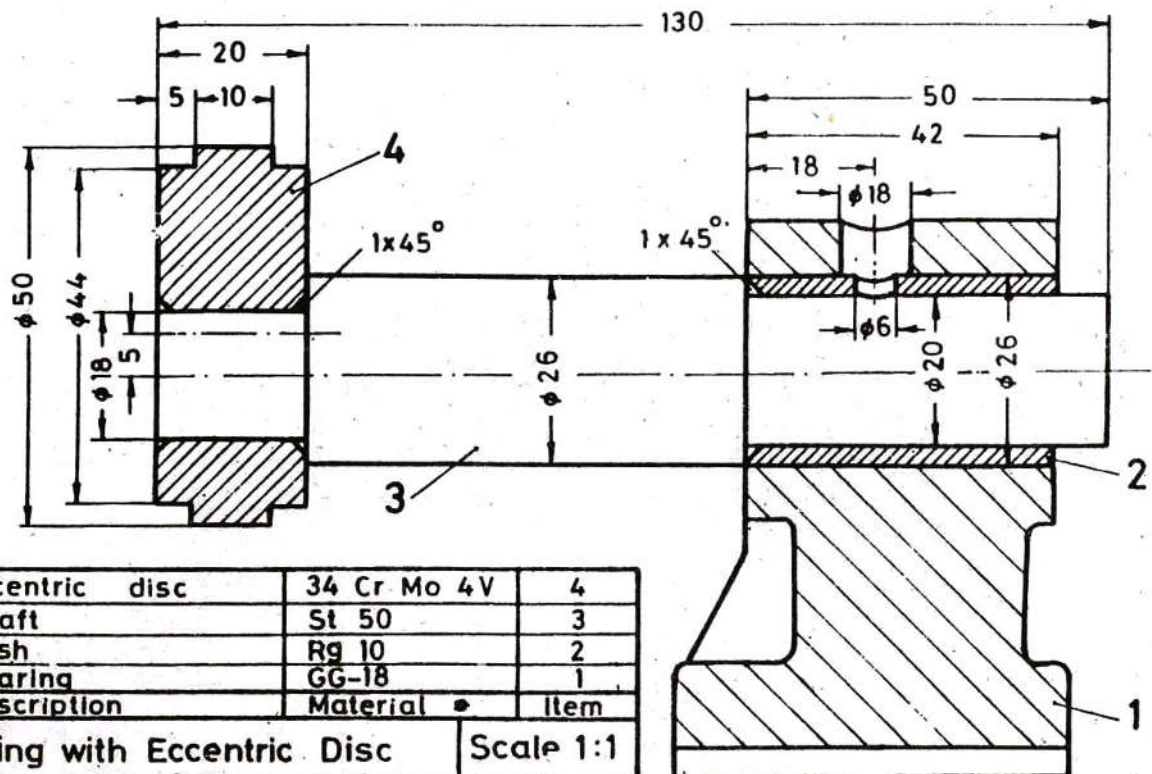
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 53

Specification of Fits in the drawing

6



1	Eccentric disc	34 Cr Mo 4 V	4
1	Shaft	St 50	3
1	Bush	Rg 10	2
1	Bearing	GG-18	1
No.	Description	Material	Item
Bearing with Eccentric Disc			Scale 1:1

Exercise: Draw parts 2,3,4 (2 & 4 sectioned) with all dimensions.
Add tolerance-symbols and surface-symbols according to table.

	Part 2		Part 3		Part 4
	$\phi 20$	$\phi 26$	$\phi 20$	$\phi 18$	$\phi 18$
Tolerances	$H7\left(\frac{+21}{0}\right)$	$n6\left(\frac{+28}{+15}\right)$	$f7\left(\frac{-20}{-41}\right)$	$s6\left(\frac{+39}{+28}\right)$	$H6\left(\frac{+11}{0}\right)$
Surfaces	surfaces with tolerances: $\nabla\nabla\nabla$ other: ∇		surfaces with tolerances: $\nabla\nabla\nabla$ other: ∇		hole: $\nabla\nabla\nabla$ faces: ∇ other: ∇

2

3

4



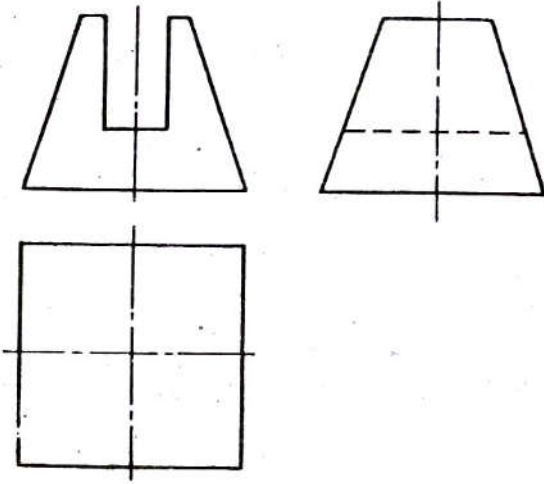
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

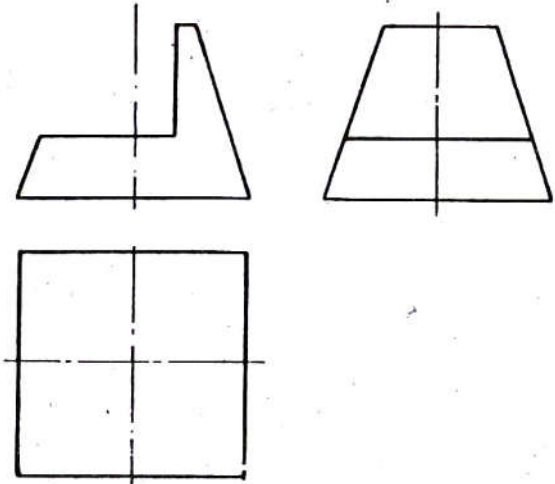
Technical
Drawing
No. 54

Complete the plan view of each of these objects (sketch)

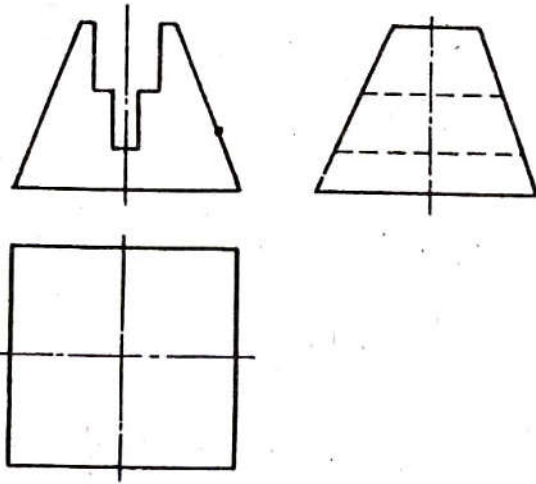
1



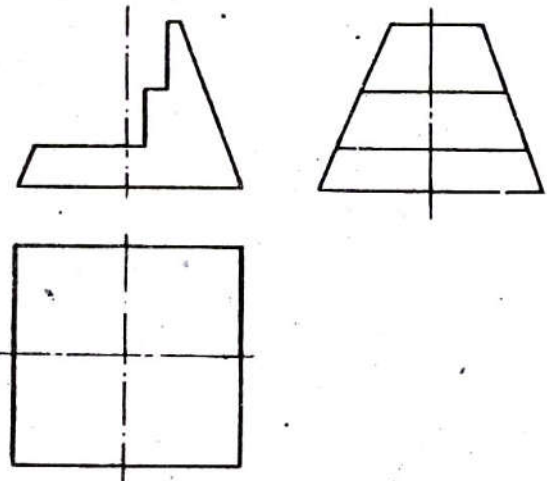
2



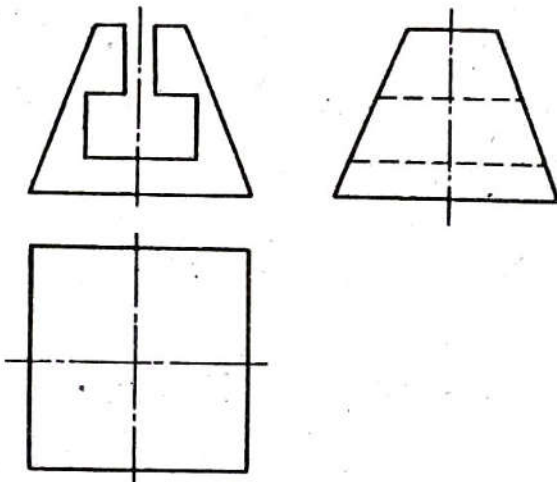
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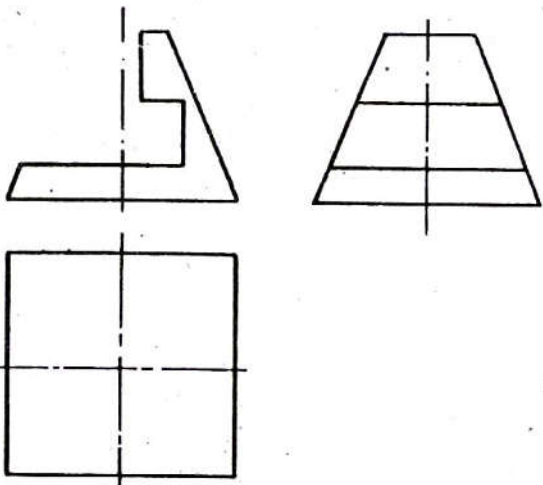
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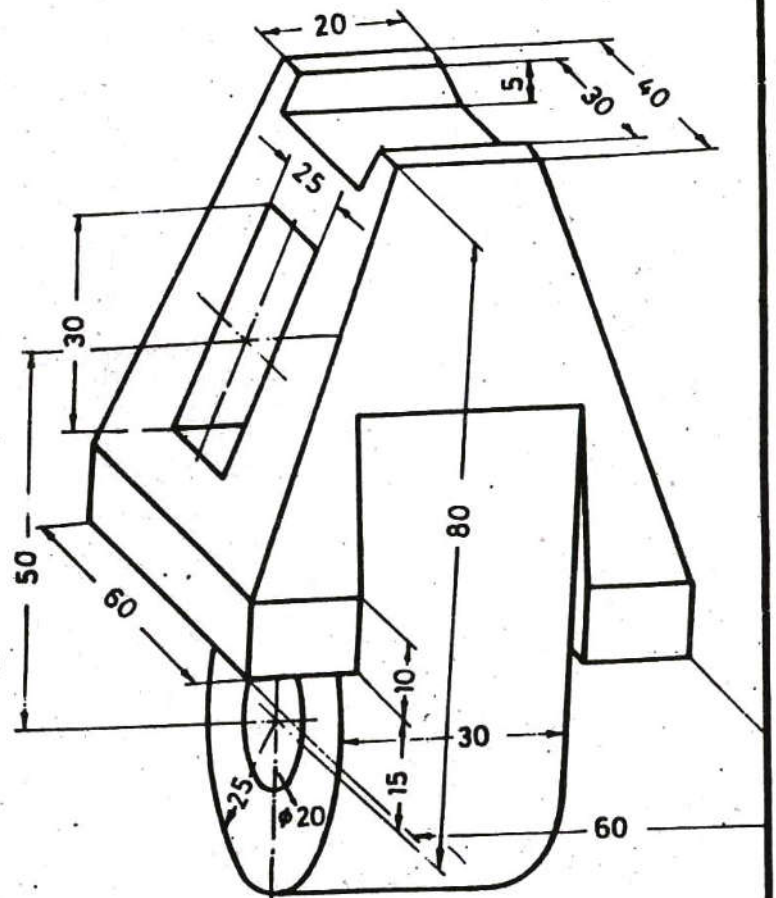


5



6





Exercise: Prepare a free hand sketch of the TOGGLE LINK in 3 views with all dimensions.
 Scale 1:1
 Bore hole: 20^{S7} , $\nabla\nabla\nabla$
 Rectangular hole: $+0.2$, $\nabla\nabla$
 Slot: 30^{H7} , $\nabla\nabla\nabla$
 All other surfaces: ∇

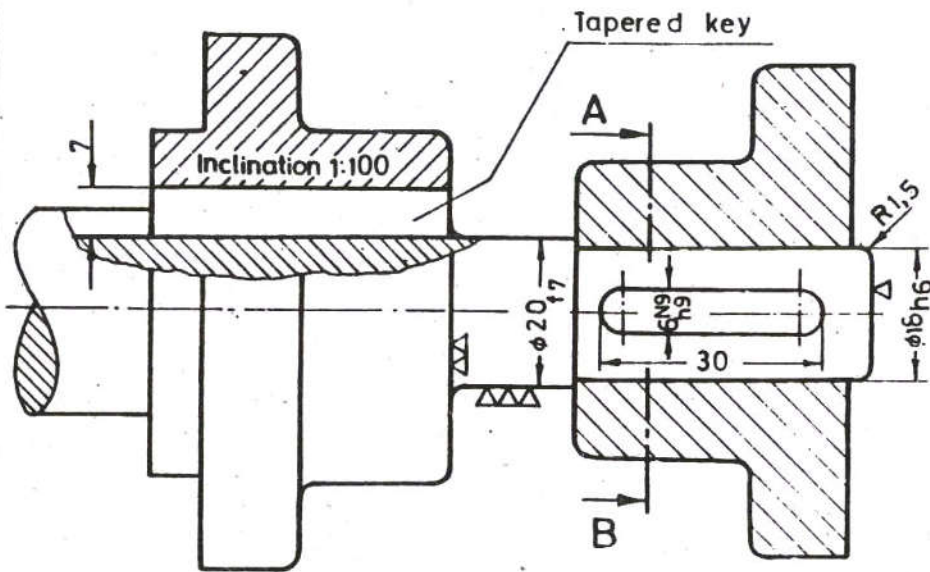


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

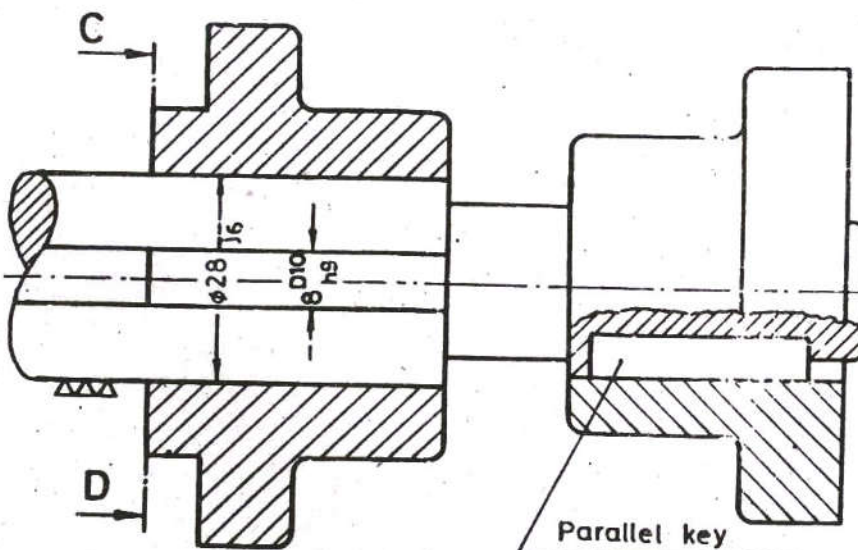
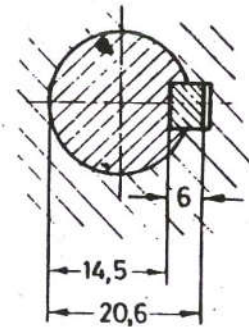
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
 Drawing
 No. 56

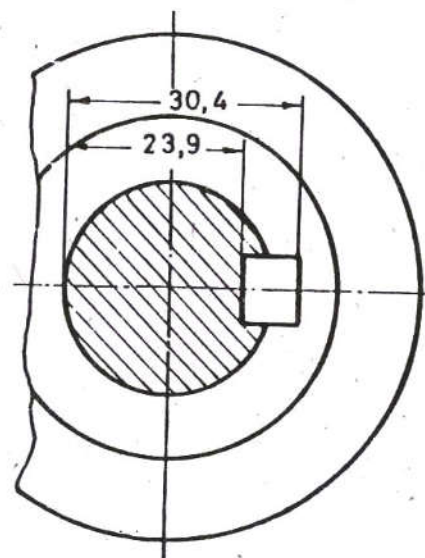
Parallel and Tapered Keys



Section A-B



Section C-D



Exercise:

1. The bearing surfaces of a parallel key are
2. The bearing surfaces of a tapered key are
3. The cross-section of the has to be drawn with clearance at the bottom face of the keyway of the hub.
4. In the representation of the the inclination (mostly 1:100) has to be entered.

Note: Keys are hatched only in cross-sectional representation (see section A-B).



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 57

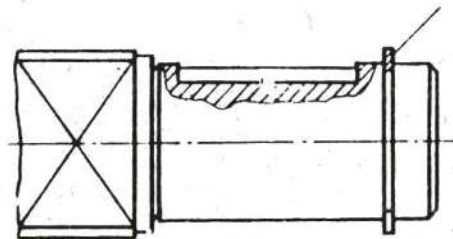
Parallel Keys

Exercise:

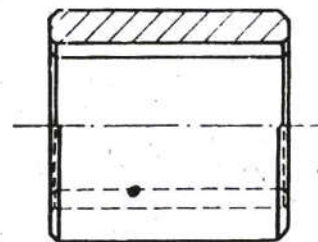
Prepare a full scale assembly drawing of the parts.

Shaft

Locking ring

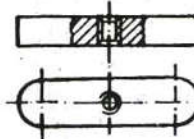


HUB



Parallel key 14x9x63

St 50K



SCALE 1:2,5

SCALE 1:1

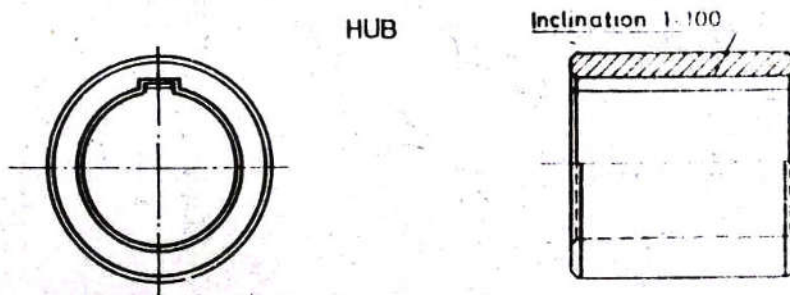


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

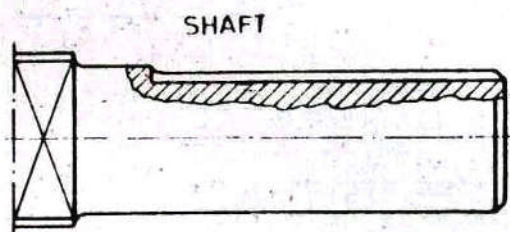
Technical
Drawing
No. 57.1

Tapered Keys



Exercise:

Prepare a full scale assembly drawing of the three parts.



Tapered key 14x5x70



SCALE 1:2,5

SCALE
1:1

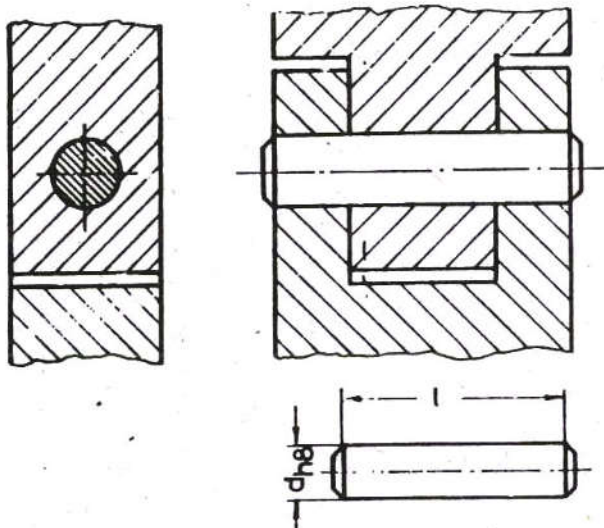


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

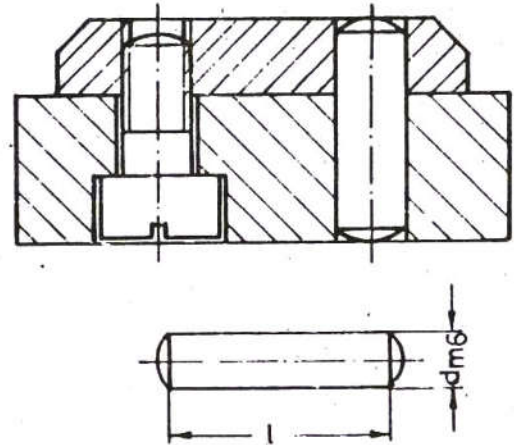
Technical
Drawing
No. 57.2

Pin - Joints



Coupling Pin

example: $4_{h8} \times 20$



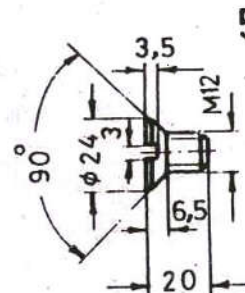
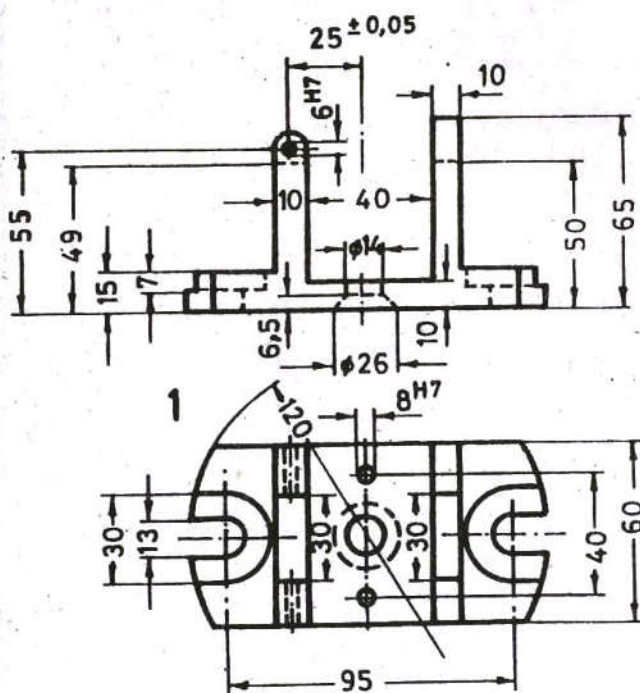
Fitting Pin

example: $6_{m6} \times 20$

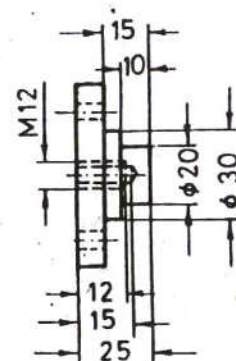
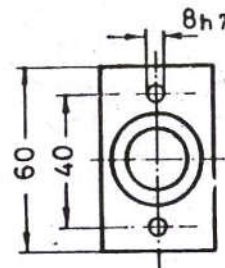
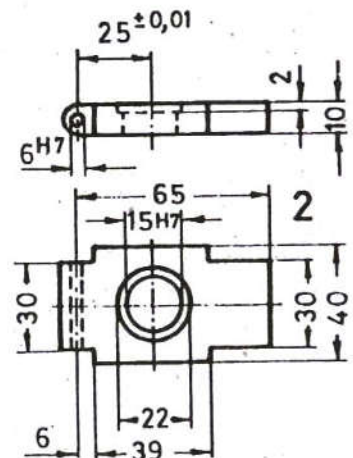
Note: Pins are only hatched in cross-section!

Coupling Pins have flat ends - **Fitting Pins** have rounded ends.

Exercise: Parts below belong to a Drilling Jig. Complete the assembly drawing on sheet 58.1 in 3 views without dimensions; elevation and side view sectioned. Take the pin dimensions from the list of parts. Drilling bush (part 3) as already given.



5



Scale 1:2,5



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

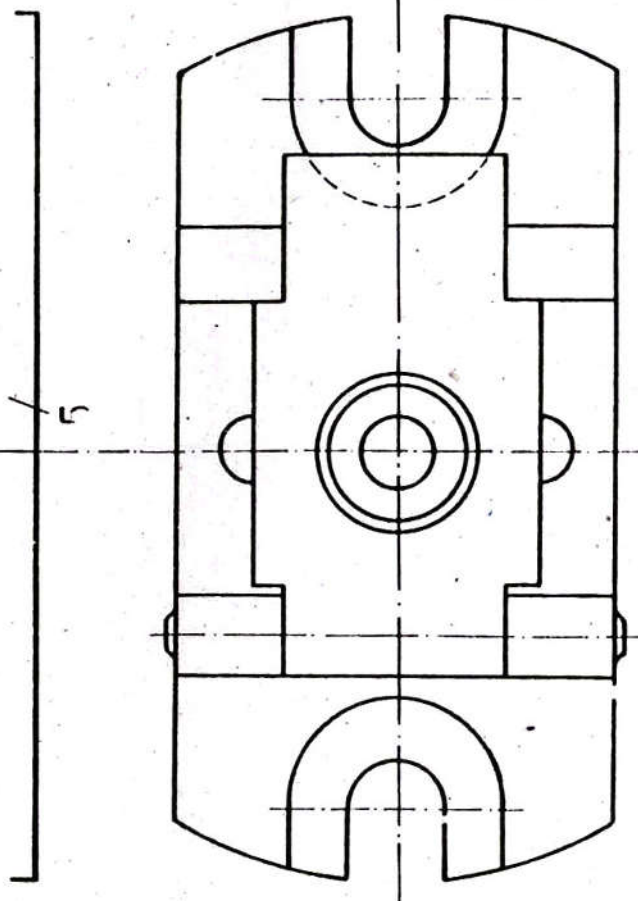
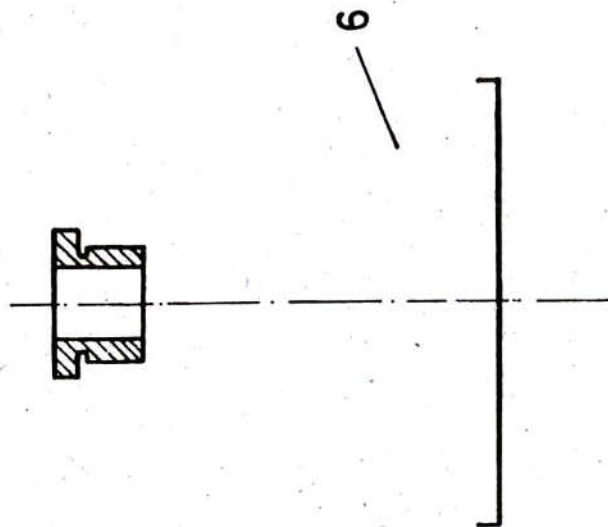
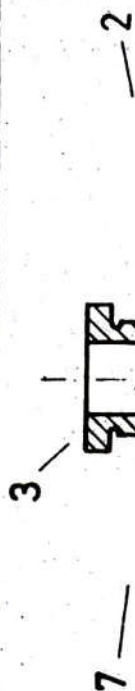
Technical
Drawing
No. 58



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 58.1



1	Cylindrical Pin 6h8 x 60	St. 50	7
2	Cylindrical Pin 8m6 x 18	St. 50	6
1	Countersunk Screw M12 x 20	5D	5
1	Worksupport	St. 34	4
1	Drilling bush A 10 x 12		3
1	Cover	St. 34	2
1	Base	St. 34	1
No.	Description	Material Item	

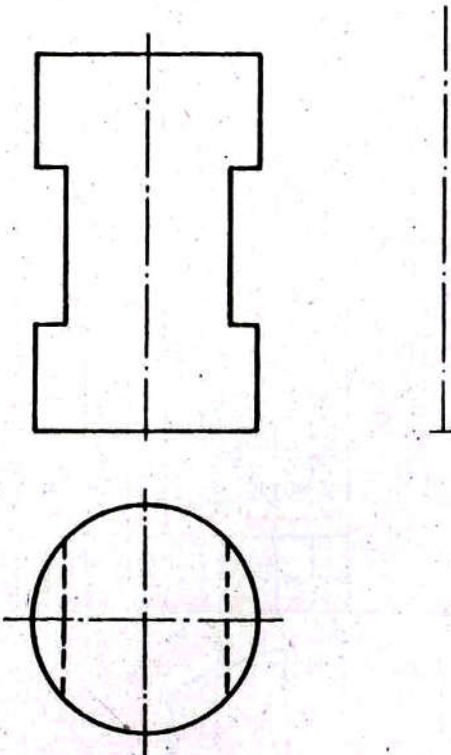
Drilling Jig

Scale. 1:1

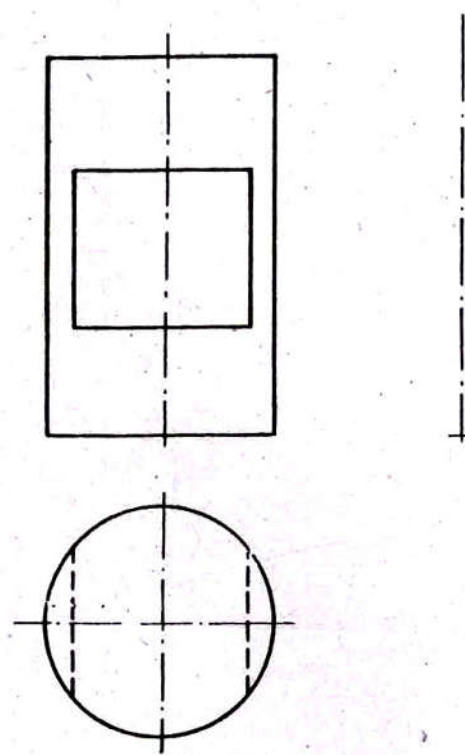
Rectangular Cuts on Cylinders

Exercise: Sketch the side view of each of these objects.

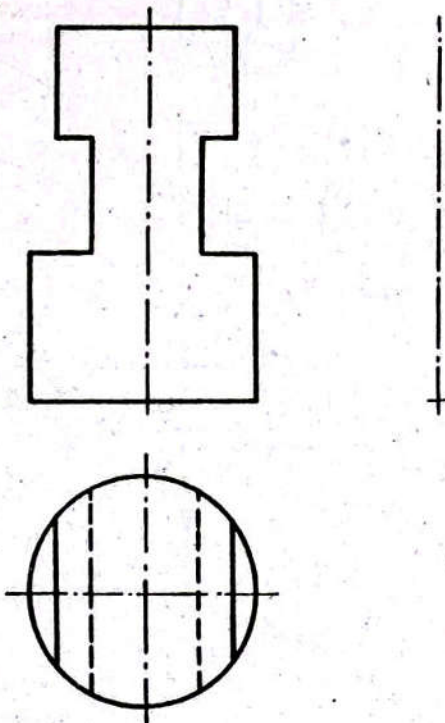
1



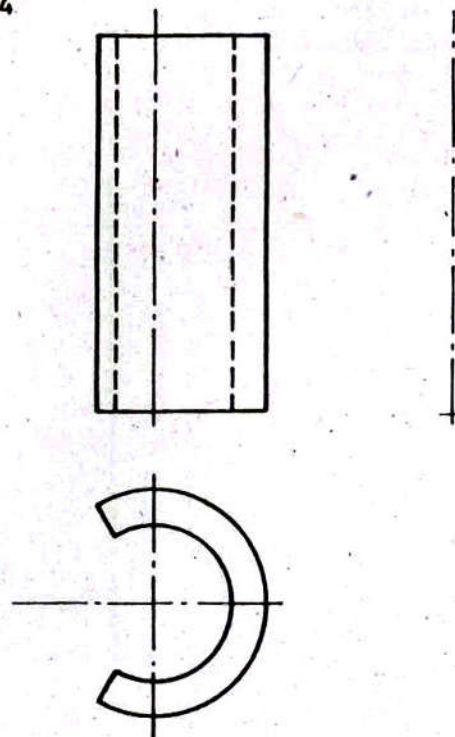
2



3



4



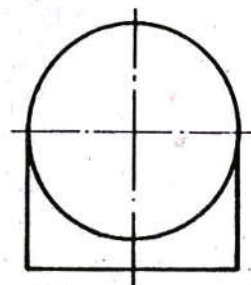
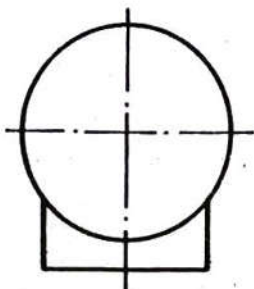
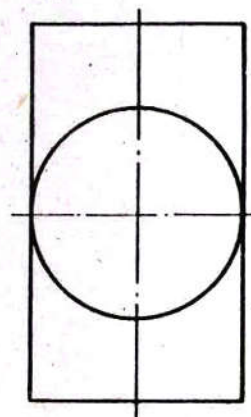
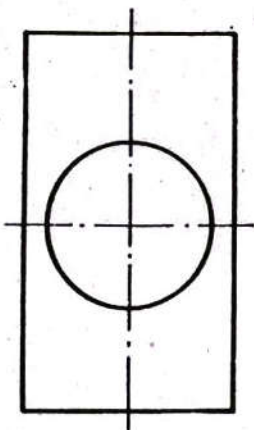
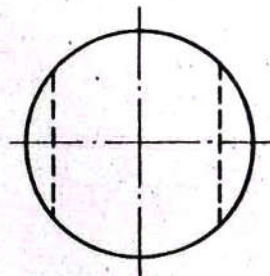
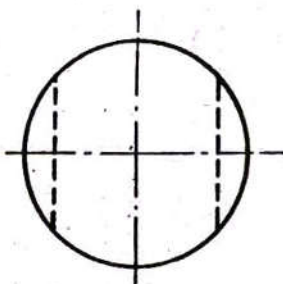
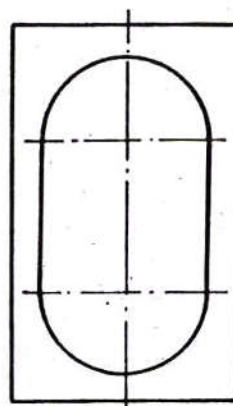
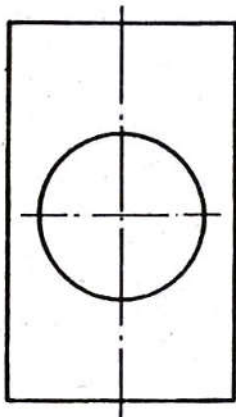
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 59

Penetrations of Cylinders

Exercise: Sketch the side view of each of these objects.



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

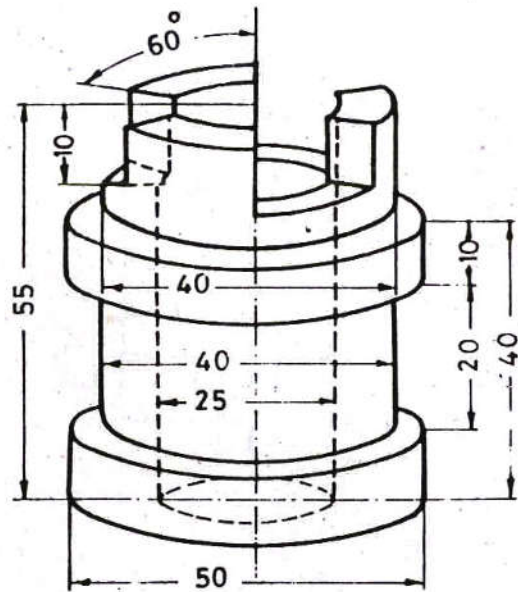
Technical
Drawing
No. 60

Cylindrical Job with Rectangular Cuts

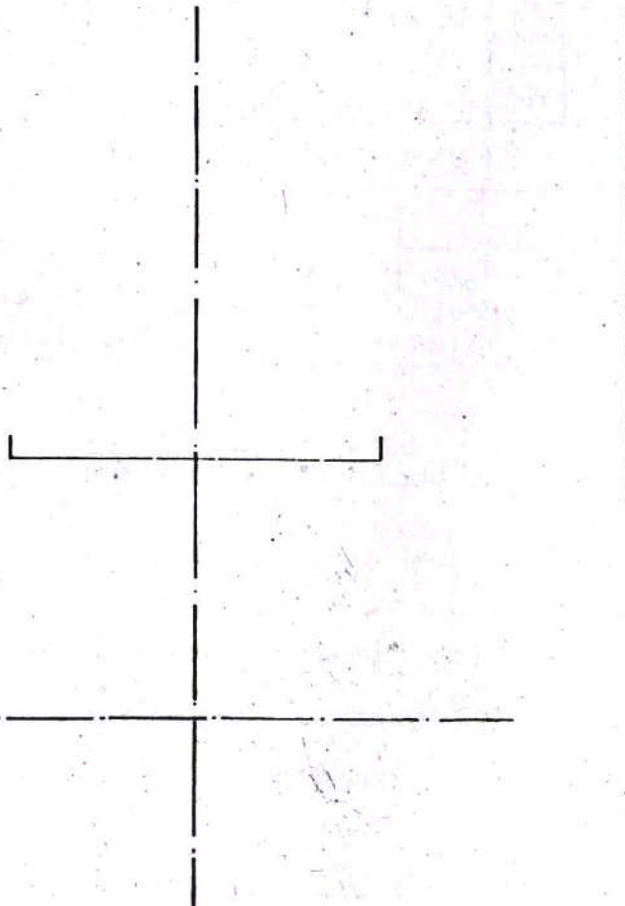
Exercise:

Draw the 'Coupling Half'
in 3 views without di-
mensions, side view
sectioned, in a free hand
sketch.

Scale 1:1



Note: For the elevation the workpiece remains in the position given in the above sketch.



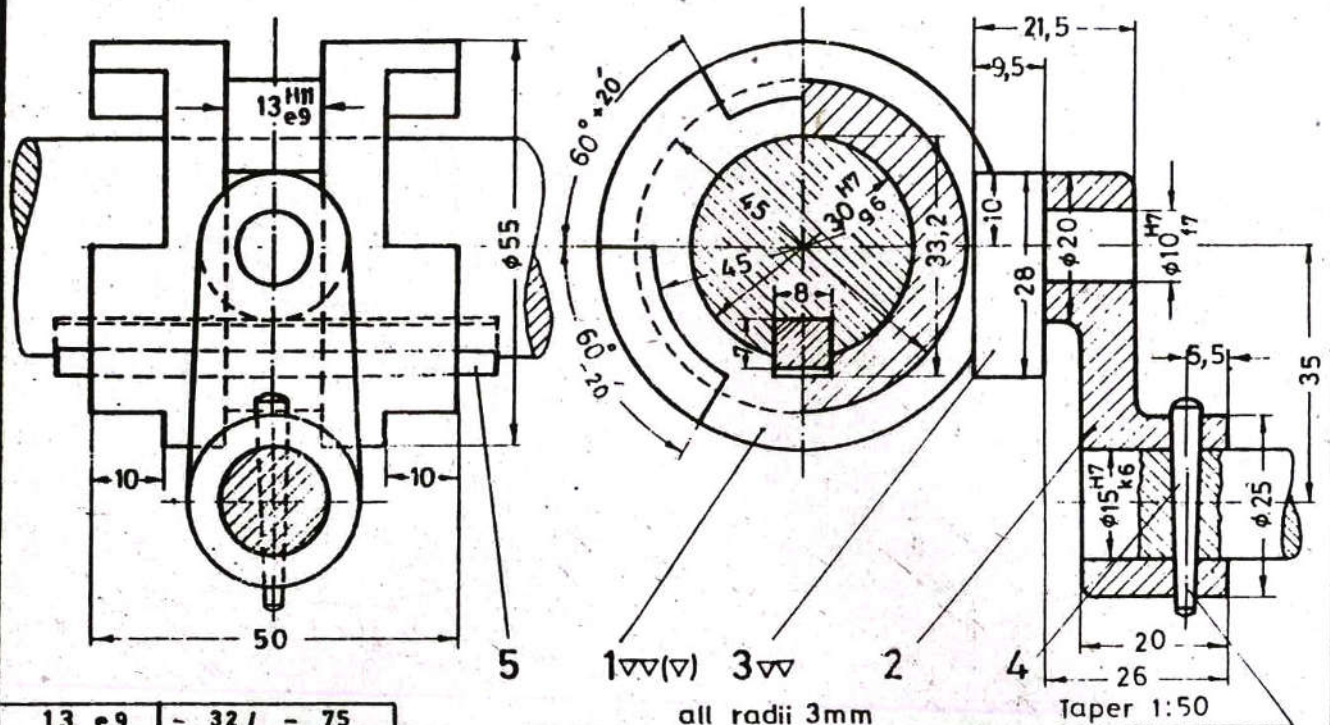
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 61

Assembled Workpieces

- Reading of drawings -



13 e9	- 32 / - 75
13 H11	+ 110 / - 0
10 f7	- 13 / - 28
10 H7	+ 15 / - 0
15 k6	+ 12 / + 1
15 H7	+ 18 / + 0
30 g6	- 7 / - 20
30 H7	+ 21 / - 0
ISO Symbol	Off-sizes

1	Parallel key 8x7x60	St 60	5
1	Taper pin 4x30	St 50	4
1	Disconnecting stone	st 42	3
1	Disconnecting lever	GT W-35	2
1	Coupling bush	GG - 22	1
No.	Description	Material	Item
UNCLUTCHING DEVICE			Scale 1:1

Note: Part 3 (disconnecting stone) is not sectioned in the side view because it is without internal structure and in order to give a better impression of what it looks like.

Exercise:

- The coupling bush slides on the shaft to engage and disengage the coupling.
How big are a) outer dia and b) inner dia of the coupling bush ?
a)mm b)mm
How wide is the slot in which the disconnecting stone (part 3) slides ?
.....mm
- Which type of fit is to be provided for the joint between parts 2 and 3 ?
.....
Why is this necessary ?
.....



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 62

Assembled Workpiece

-Preparation of detail drawings -

Exercise: Draw parts 1,2,3 of the Unclutching Device as single parts in elevation and side view, (side view of part 2 sectioned). Enter all dimensions.

Part 1

Part 2

Part 3

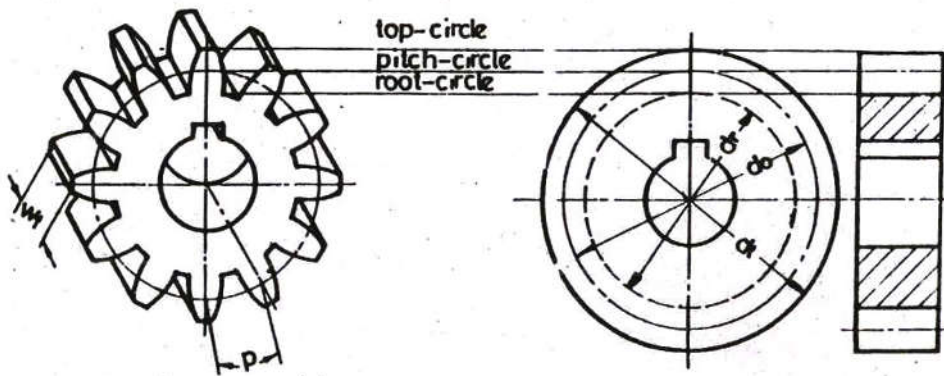


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 63

Representation of Gears I



Note: Technical representation of gear wheels does not show the single teeth.

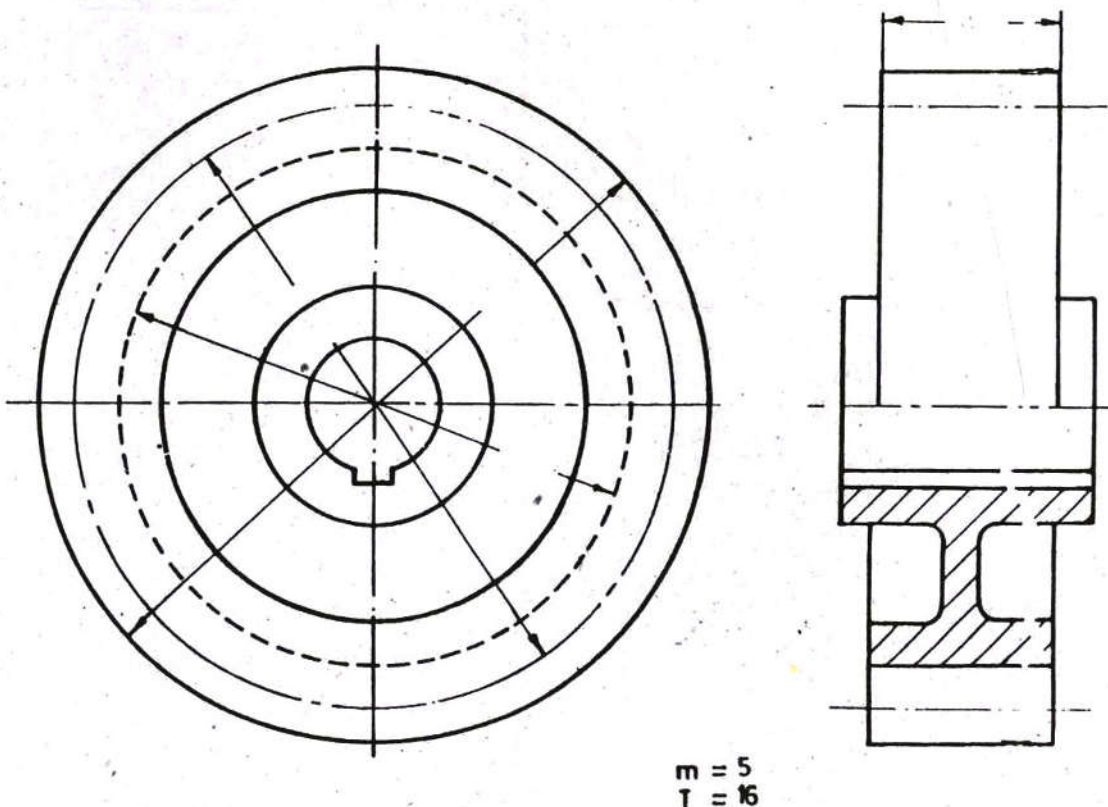
Exception: When the drawing is used for gear wheel production. Then however normally a few teeth are shown in an enlarged detail.

Drawings of gear wheels must give the following dimensions:

d_t = dia of top circle	T = number of teeth (e.g.: $T = 20$)
d_o = dia of pitch circle	w_f = width of face
m = module	(e.g.: $m = 6$)

Sometimes also the root dia, d_r is given.

Exercise: Enter the missing letters in the drawing below. Scale 1:1.



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PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 64

Representation of Gears II

-Symbols-

Tech. Representation	Simplified Represent.	Tech. Representation	Simplified Represent.
Spur gears		Helical gears on shafts at angles from each other	
Worm and Wormgear		Bevel gears	
Spur gear with Gear rack		Chain wheels	
Straight herring bone			

Exercise: Draw a pair of spur gears in two ways:

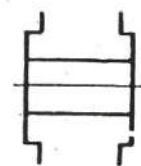
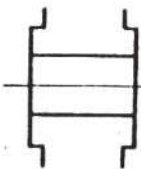
- a technical representation (sectioned) and
- in simplified representation.

Dimensions of the pinion (small gear): $d_t = 69\text{mm}$; $d_o = 63\text{mm}$; $d_r = 56\text{mm}$; $T = 21$

Dimensions of the large gear: $d_t = 105\text{mm}$; $d_o = 99\text{mm}$; $d_r = 92\text{mm}$; $T = 33$

$m = 3$; $W_f = 25\text{mm}$; Scale: 1:2.5

Enter all necessary dimensions !

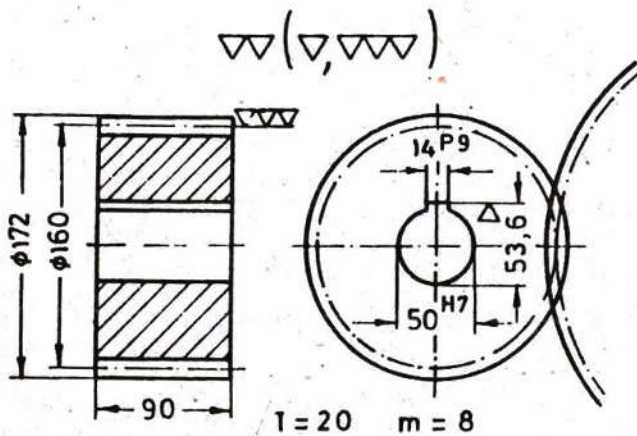


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

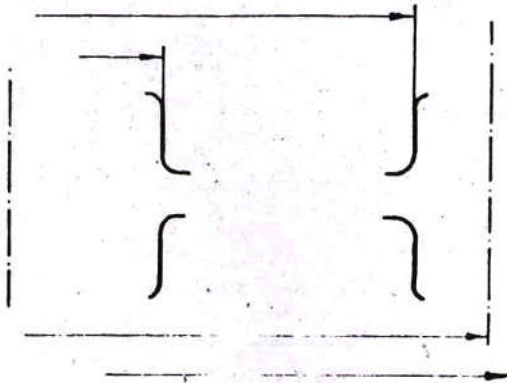
Technical
Drawing
No. 65

Representation of Gears III



Exercise: The picture shows a pinion in scale 1:5. Draw the corresponding spur gear which shall result in a transmission ratio 2:1 in front view (sectioned) and top view (scale 1:2,5). Enter all necessary dimensions.

Some important hints are given below (i.e. centre line, pitch, hub and hub keyway). The flange between hub and tooth ring has 4 holes of $\phi 70$ on a hole circle of $\phi 186$.



all Radii $r = 4$

64,3



~(▽,▽,▽,▽)

$z =$ $m =$



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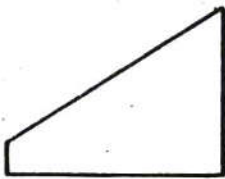
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 66

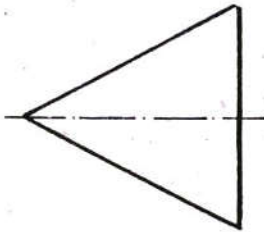
Angular Cuts on Prisms

Exercise: Sketch the side view of each of these objects.

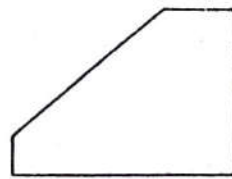
1



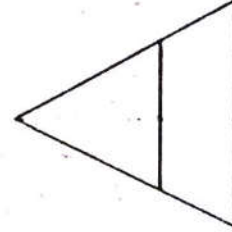
⊥



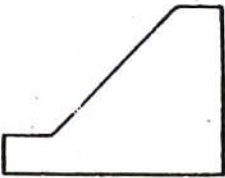
2



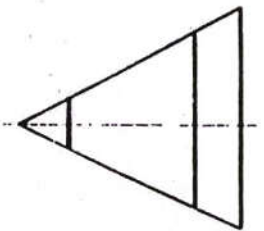
⊥



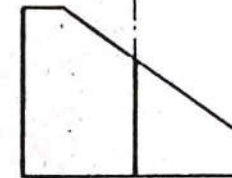
3



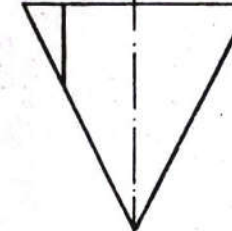
⊥



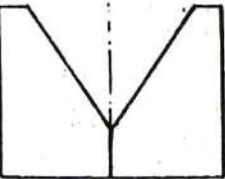
4



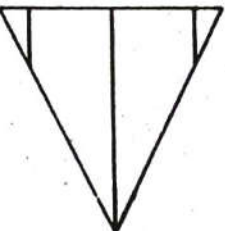
L



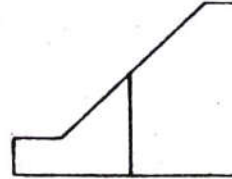
5



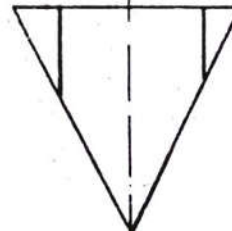
L



6



L



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

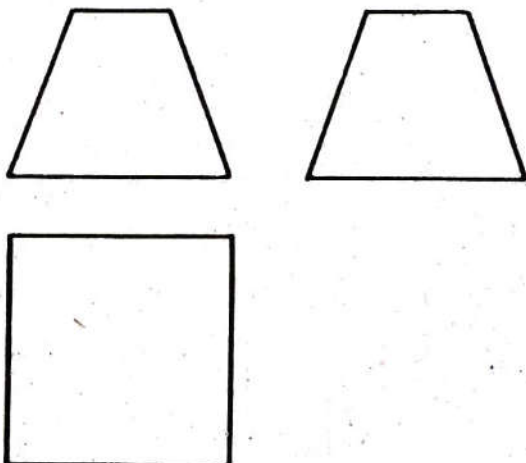
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 67

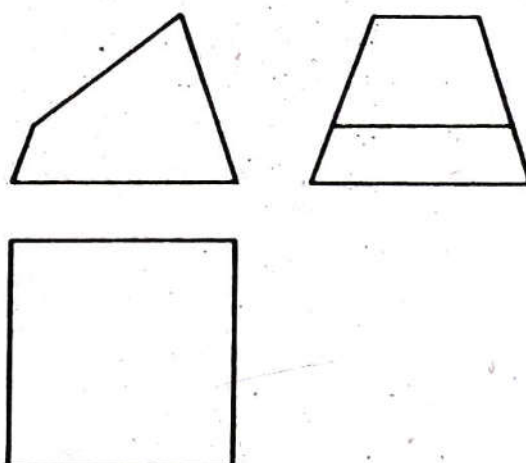
Angular Cuts on Pyramids

Exercise: Complete the plan view of each of these objects (sketch).

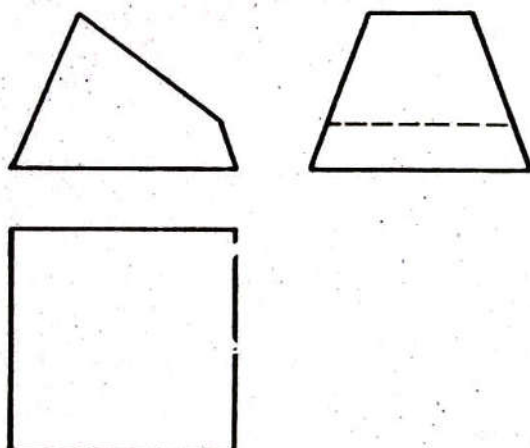
1



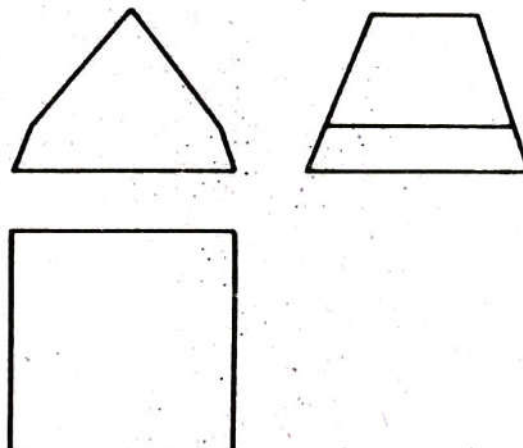
2



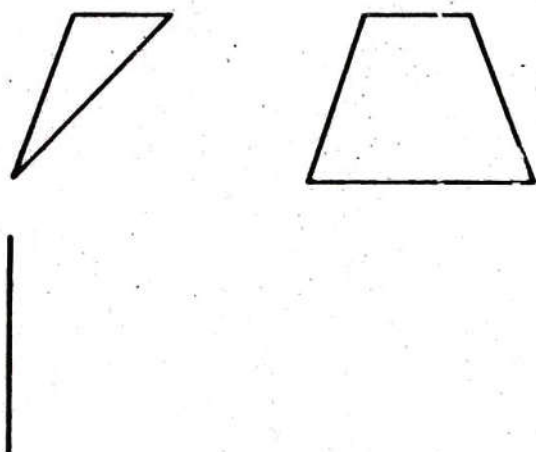
3



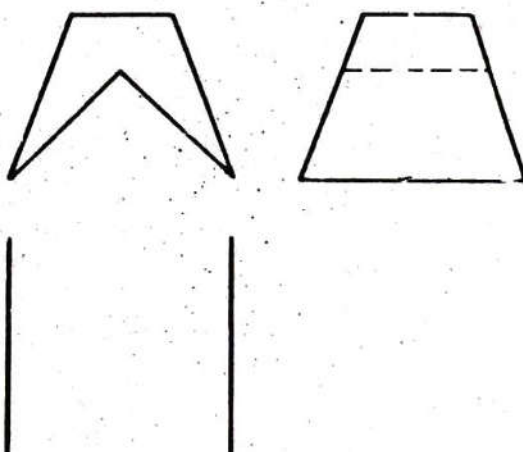
4



5



6



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

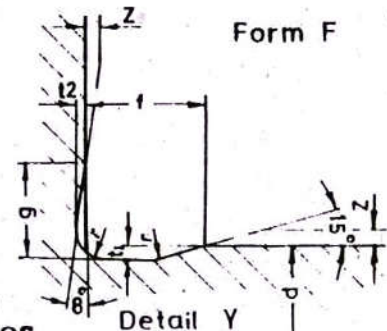
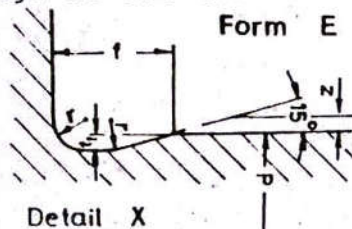
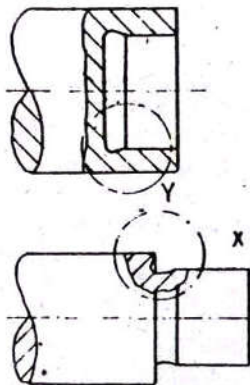
Technical
Drawing
No. 68

Internal and External Recess

Recesses are usually represented in either of the two possibilities shown below.

I. Complete Representation

If complete Representation is chosen, all necessary dimensions are given in enlarged detail drawings as are shown in 'Detail X' and 'Detail Y'.

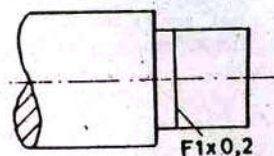
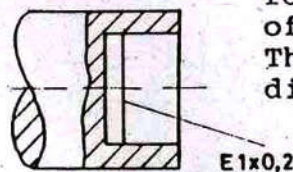


Note: The machining allowance 'Z' has to be added for the grinding operation and is taken from tables.

II. Simplified Representation

If simplified Representation is chosen, the dimensions of the recess have to be taken from a table. In this case the drawing contains designation of form (letters "E" or "F") and the size ($r \times t_1$) of the recess.

The detail drawings on top of this sheet show the difference between Form E and Form F.

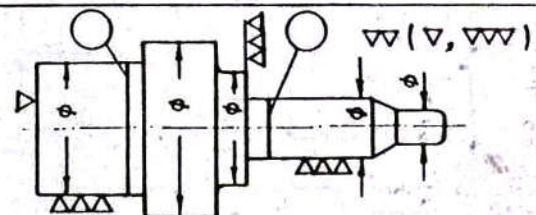
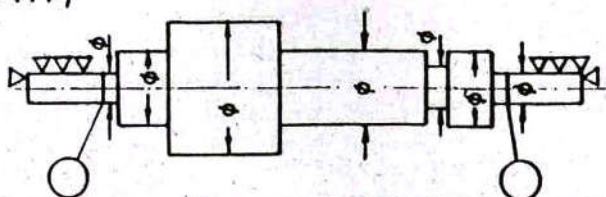


d	t0	r	t1	f	g	t2
over			+0,1		≈	+0,05
-	1,6	0,1	0,1	0,5	0,8	0,1
16	3	0,2	0,1	1	0,9	0,1
3	10	0,4	0,2	2	1,1	0,1
10	18	0,6	0,2	2	1,4	0,1
18	80	0,6	0,3	2,5	2,1	0,2
over 80		1	0,4	4	3,2	0,3

Exercises:

1. Recess 'Form E' is used if
2. Recess 'Form F' is used if
3. Enter the correct letter (E or F) for the form of the recess of the workpieces in the circles.

▽ (▽, ▽)



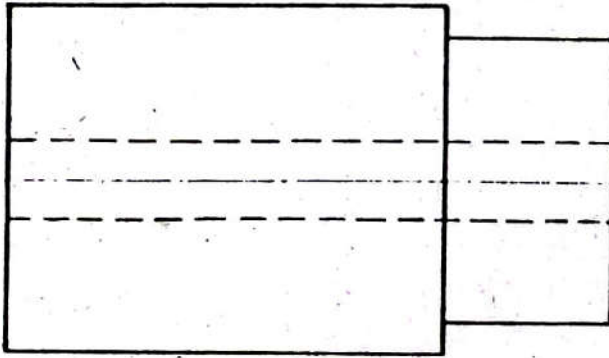
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 69

Dimensioning according to Machining Process

- Turning I -

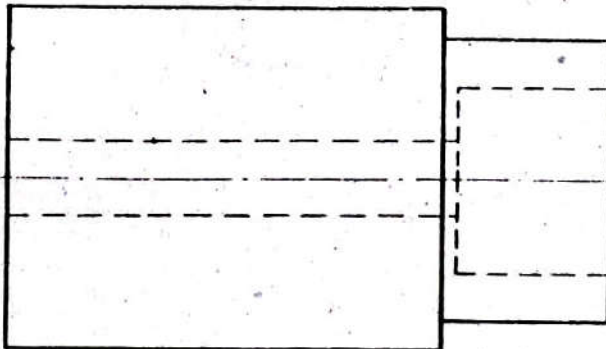


Exercise:

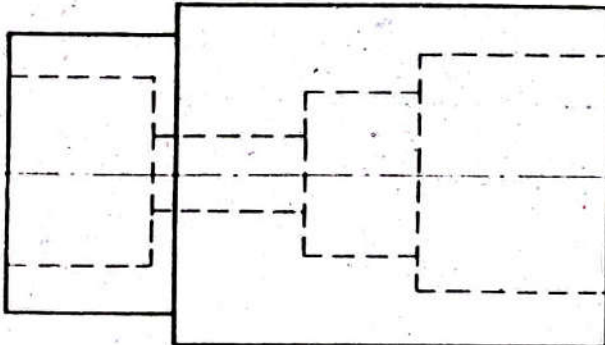
Complete the section view of the turned workpiece with the dimensions according to the given sequence of the machining process.

Sequence of operations

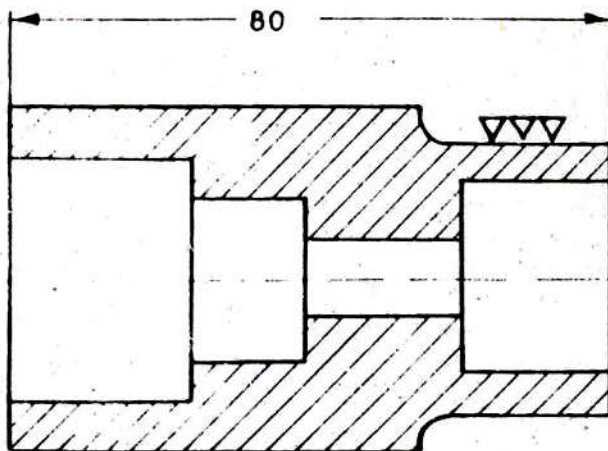
- 1.-Boring $\varnothing 10$ mm
- Roughing to $\varnothing 46$ mm
- Roughing to $\varnothing 37$ mm, length 22 mm



- 2.-Internal turning
 $\varnothing 25$ mm, 20 mm deep



- 3.-Reclamping
- Internal turning
 $\varnothing 22$ mm, 40 mm deep
- Internal turning
 $\varnothing 32$ mm, 25 mm deep
- Finishing
outside dia 45 mm



- 4.-Reclamping
- Finishing $\varnothing 36$ mm, length 23 mm
- Turning of radius
 $R = 3$ mm

▽ (▽▽)



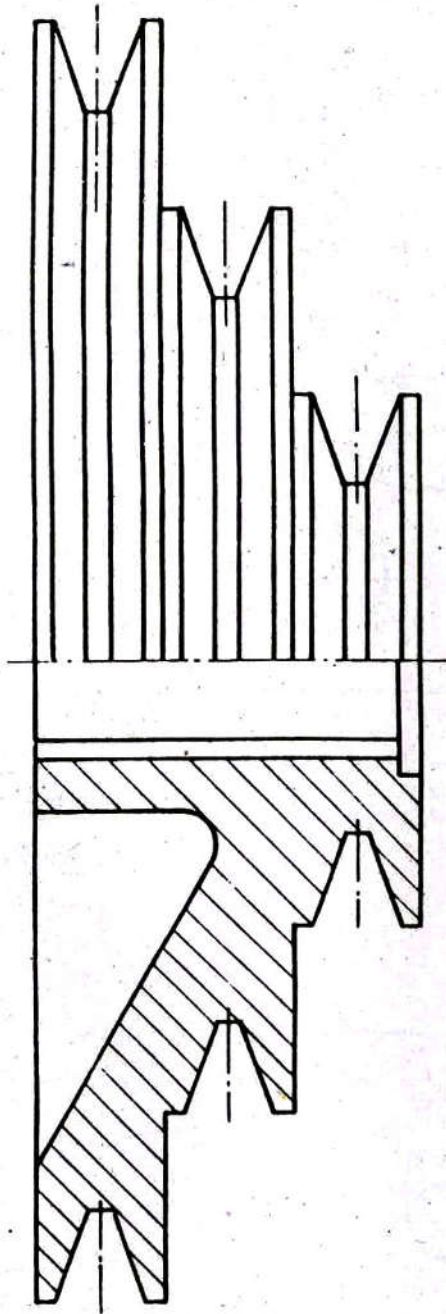
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 70

Dimensioning according to Machining Process

- Turning II -



VEE - PULLEY

SCALE 1:1

Exercise: Enter all dimensions in accordance with the machining process.
Find the correct surface symbols.



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 70.1

Dimensioning according to Machining Process

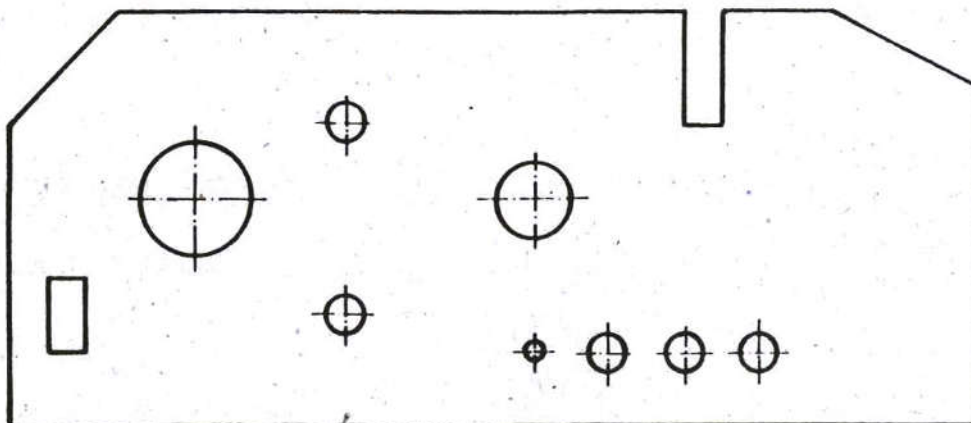
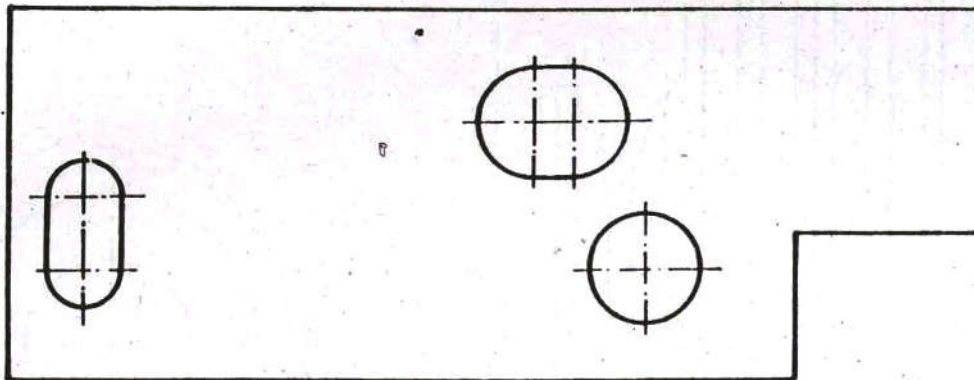
- Drilling I -

Note:

- Dimensioning of holes has to be done under consideration of production method and tools.
- The dimensions can be entered from two reference edges or from the centre line. They can refer either to the centre point or to the edge of the hole, (e.g. in case of milled oblong holes).
- Thickness of the material (sheet metal) shall be given on the workpiece; if there is not enough space it is written beside the drawing.

Exercise:

Enter all dimensions in accordance with the production requirements (thickness: 3 mm).



Scale 1:1



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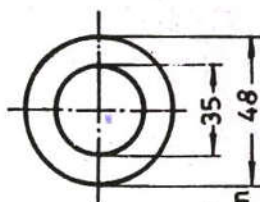
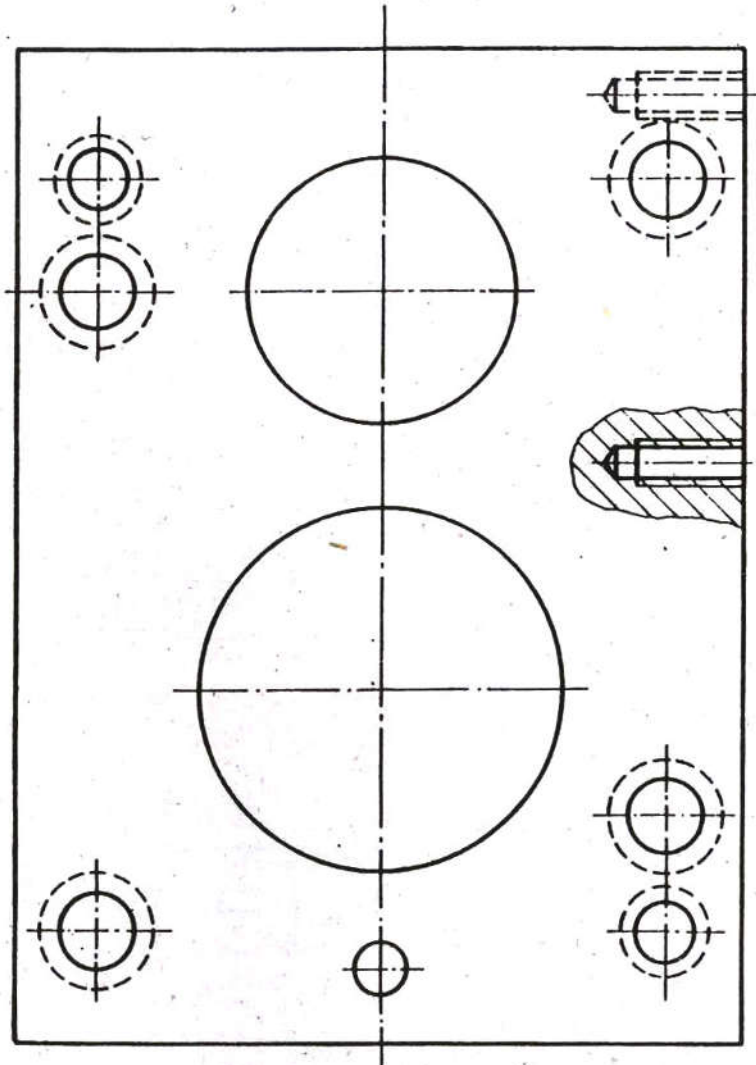
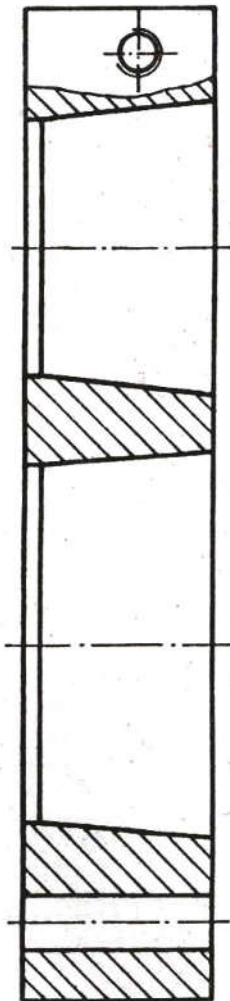
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 71

Dimensioning according to Machining Process

- Drilling II -

Exercise: Enter all dimensions according to marking and drilling operations. Find the correct surface symbols.



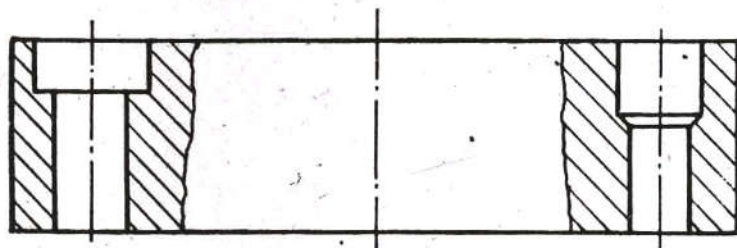
PIECE PART

Thickness = 2 mm

Material St 42

Thus: $\tau_B = 34 \text{ Kp/mm}^2$

Cutting Clearance = 0.12 mm



PIERCING DIE

SCALE 1:1



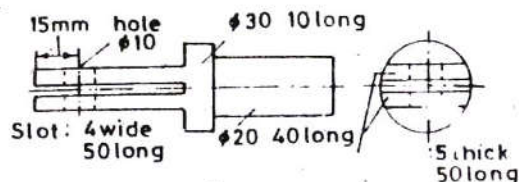
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 72

Dimensioning according to Machining Process

- Turning, drilling, milling -



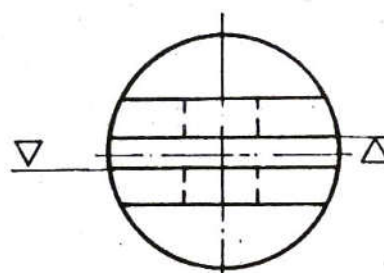
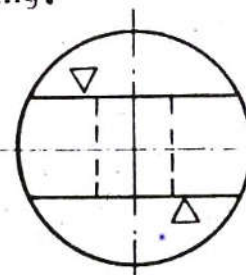
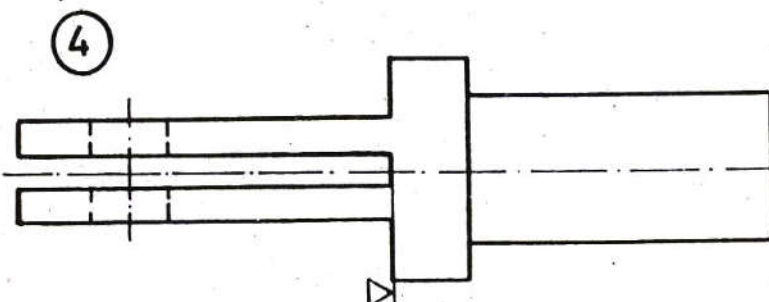
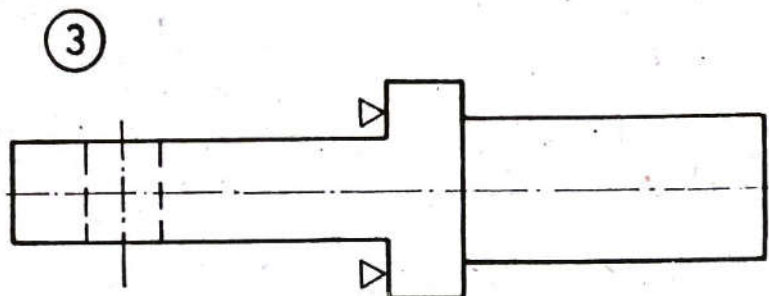
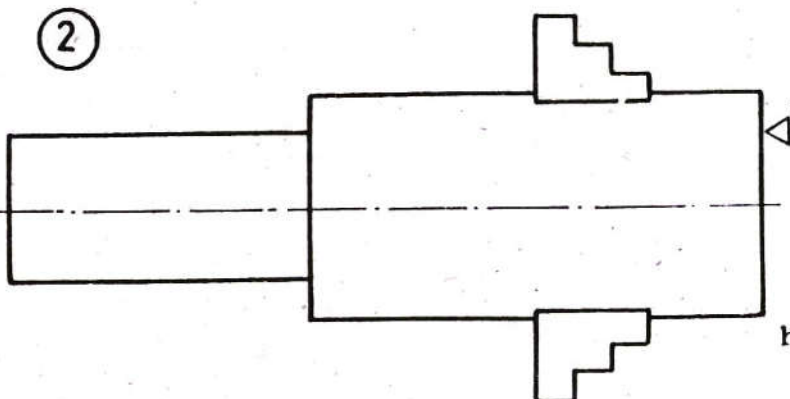
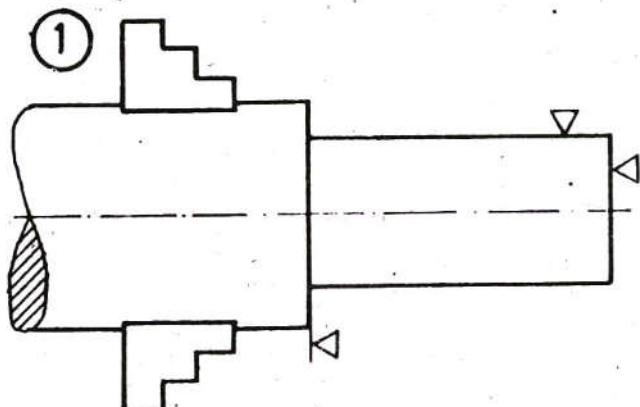
CLAMPING PIECE

Exercises:

a) Fill in the sequences of operation as indicated by the four drawings

1.
2.
3.
4.
5.
6.
7.

b) Enter the dimensions, relevant for every single machining operation in the respective drawing.



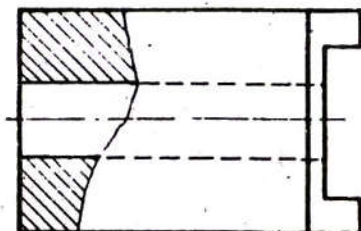
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

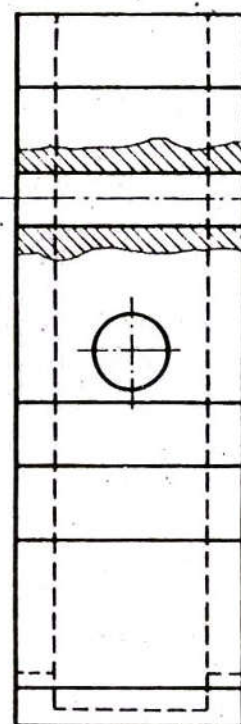
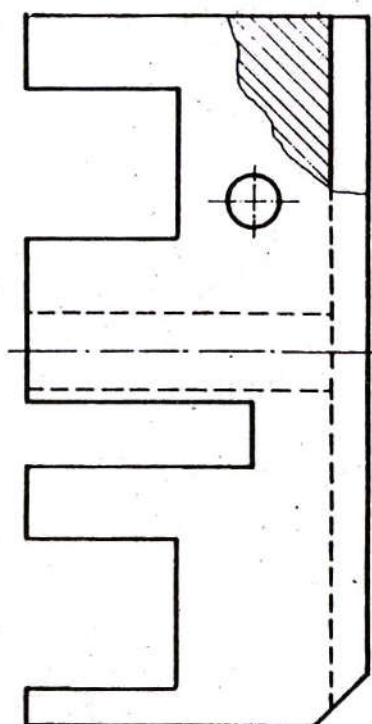
Technical
Drawing
No. 73

Dimensioning according to Machining Process

- Milling -



SLIDING PIECE
Scale 1:1



SLIDING PIECE
SCALE 1:1

Exercise: Enter all dimensions according to the requirements of the milling operations.

Surfaces: sides of the three deep grooves: ▽▽▽

bottom of flat groove: ▽

all others: ▽



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PAK-GERMAN TECHNICAL TRAINING PROGRAMME

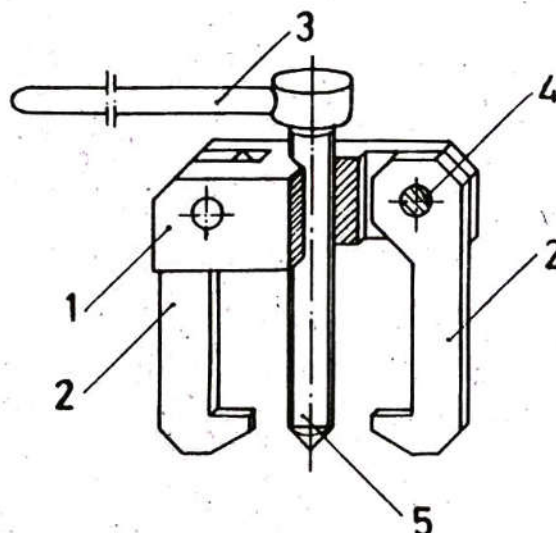
Technical
Drawing
No. 73.1

Drawing from Models

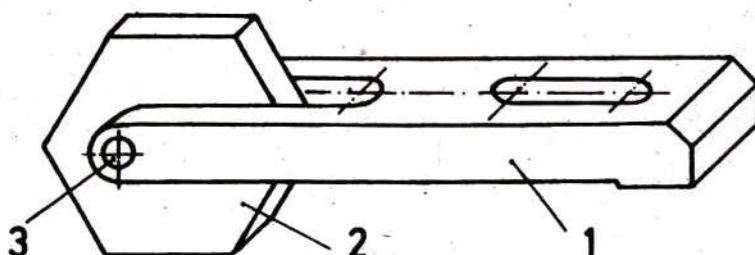
- Puller -

Exercise:

- I. Draw the elevation view of the assembled puller in scale 1:1 from model.
Half section as shown.
- II. -Draw parts 1, 2, 3 and 5 in as many views as necessary; scale 1:1.
-Enter all dimensions and other information which are needed for production.
-Prepare the complete list of parts.



- Clamping Piece -



Exercise:

- I. Draw the complete Clamping Piece in such a way that all important portions can be recognized; scale 1:1.
- II. -Draw parts 1 and 2 in as many views as necessary; scale 1:1.
-Enter all dimensions and other informations needed for production.
-Prepare the list of parts.

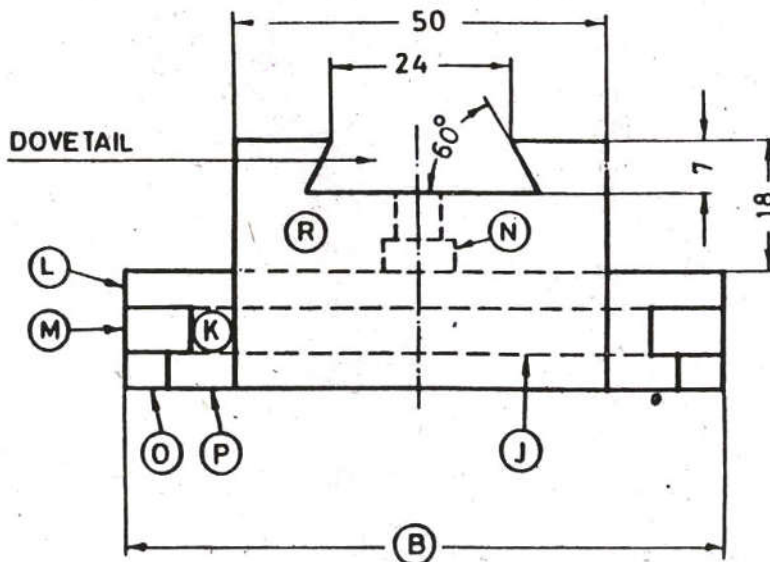
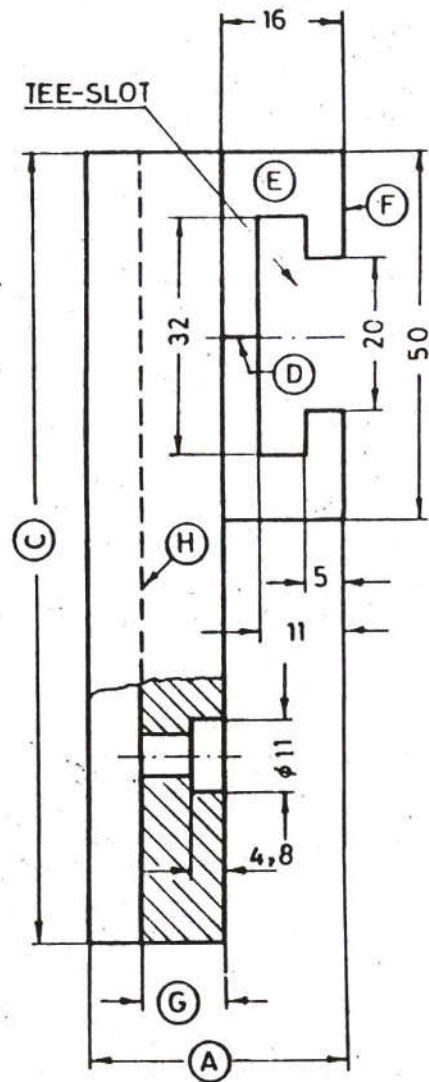
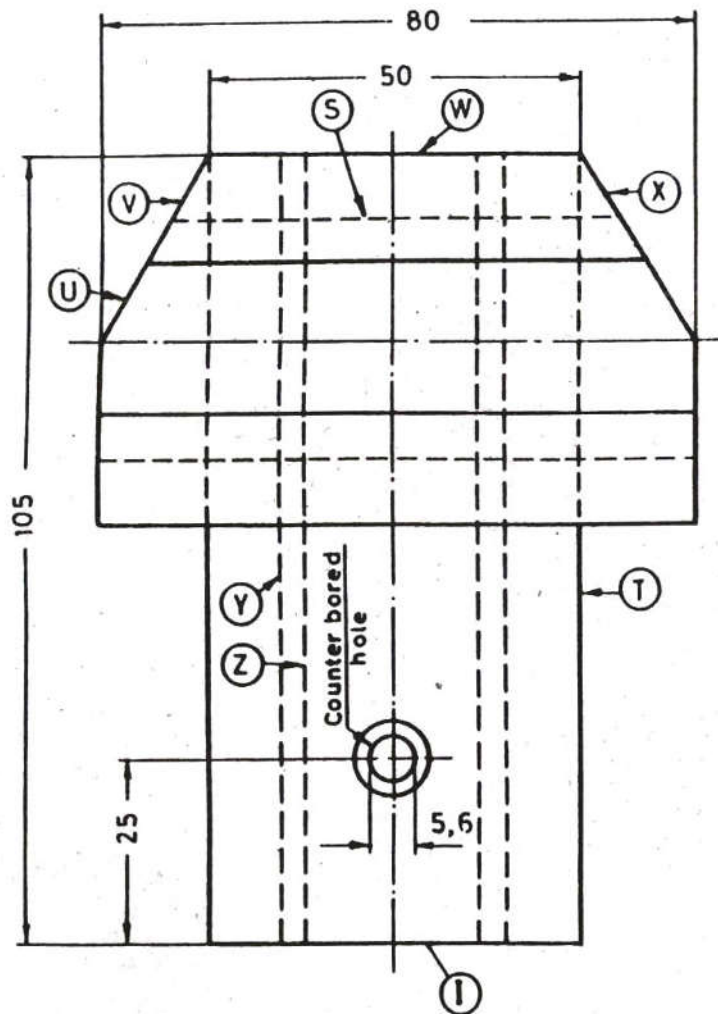


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
Nos. 74/75

Reading of Drawings I



DOVETAILED GUIDE
SCALE 1:1

Exercise see sheet No. 76.1



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 76

Exercise: Answer the following questions with the help of the drawing on sheet No. 76.

1. The overall thickness of the dovetailed slide is:

A = _____ mm.

8. The edge "D" in the side view is represented by what edge in the plan view ?

edge "D" (side) = edge _____ (plan)

2. The maximum length of the tee-slot is:

B = _____ mm

9. The surface "E" in the side view is represented by what surface in the plan view ?

surf. "E" (side) = surf. _____ (plan)

3. The overall length of the dovetail is:

C = _____ mm

10. The edge "F" in the side view is represented by what edge in the plan view ?

edge "F" (side) = edge _____ (plan)

4. The overall depth of the counter-bored hole is:

G = _____ mm

11. The edge "H" in the side view is represented by what edge in the elevation ?

edge "H" (side) = edge _____ (elev)

5. The depth of the counter-bore is:

_____ mm

12. The surface "R" in the plan view is represented by what edge in the elevation ?

surf. "R" (plan) = edge _____ (elev)

6. The diameter of the counter-bore is:

_____ mm

13. The edge "P" in the plan view is represented by what edge in the elevation ?

edge "P" (plan) = edge _____ (elev)

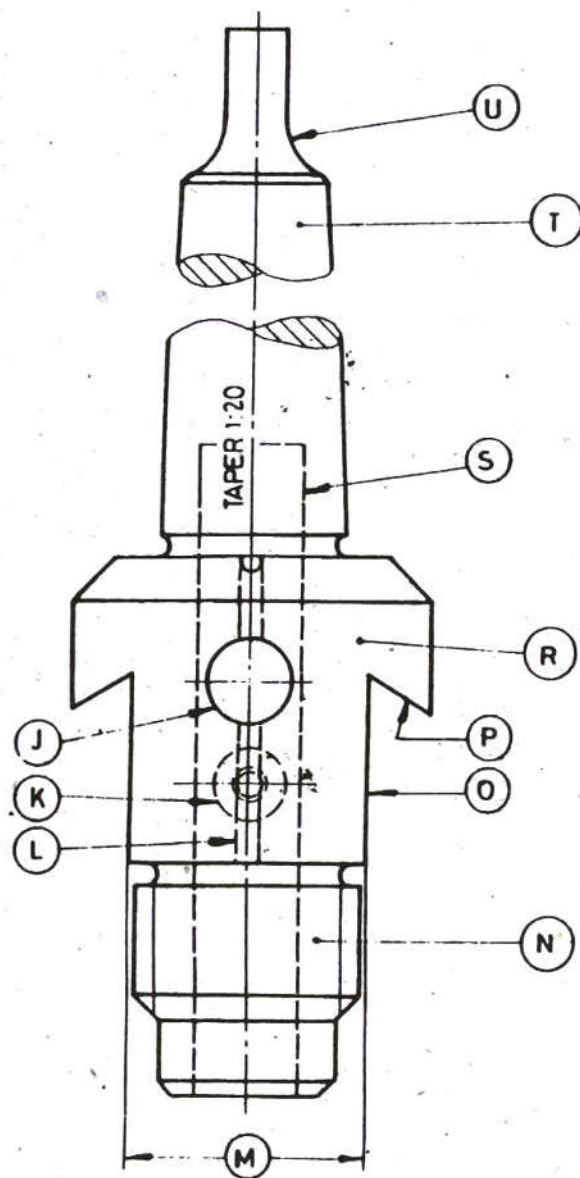
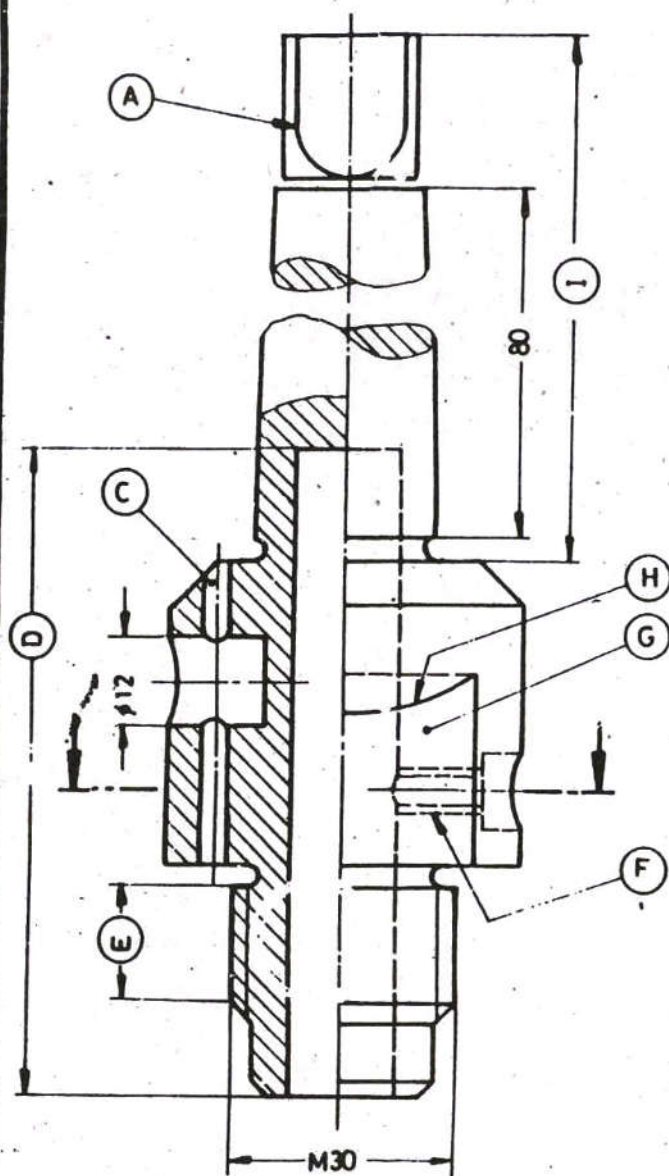
7. By what line is the wall of the counter-bore represented in the plan view ?

line _____

14. The edge "J" in the plan view is represented by what line in the elevation ?

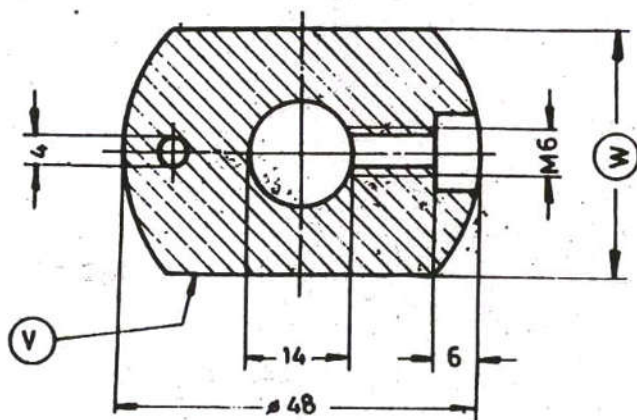
edge "J" (plan) = edge _____ (elev)





HOLDER FOR
CIRCULAR CUTTER

SCALE: 1:1



Exercise see sheet No. 77.1



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 77

READING OF DRAWINGS II (Circular Cutter)

Exercise: Answer the questions with the help of the drawing on sheet No. 77.

1. The circular cutter has a tapered shank.
The shank is marked by letter _____
2. The overall length of the shank is given by dimension _____
3. The taper ratio of the tapered portion is _____
4. The length of the taper is _____ mm
5. The edge "U" in the side view is represented in the elevation by line _____
6. The diameter of the cylindrical portion "R" is _____ mm
7. The cylindrical portion has been cut out. The cut out is represented in the side view by the lines _____ and _____
8. The dimension "M" in the side view is equal to what dimension in the plan view ? _____
9. The flat surface "G" in the elevation is represented in the side view by line _____
10. The flat surface "G" in the elevation is represented in the plan view by line _____
11. The edge "P" in the side view is represented in the elevation by line _____
12. The type of thread on portion "N" is specified by the dimension _____
13. The length of the external thread is given by dimension _____
14. The diameter of the blind hole in the centre of the circular cutter is _____ mm
15. The overall length of the blind hole in the centre is given by dimension _____
16. The wall of the blind hole in the centre is represented in the side view by line _____
17. A counter-bored hole with internal thread is represented in the elevation. The thread is marked with letter _____
18. The thread cut in this hole is specified by dimension _____
19. The depth of the counter-bore on this threaded hole is _____ mm
20. The counter-bore on the threaded hole is represented in the side view by line _____
21. A blind hole which is cut into the side of the cylindrical portion is represented in the elevation.
The diameter of this blind hole is _____ mm
22. This blind hole is represented in the side view by line _____
23. The hole $\varnothing 4$ (plan view) is represented and marked in the elevation by letter _____
24. The hole $\varnothing 4$ is represented and marked in the side view by letter _____



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
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